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Hurricane-Induced Stage-Frequency Relationships for the Territory of American Samoa

Adele Militello, Norman W. Scheffner, and Edward F. Thompson

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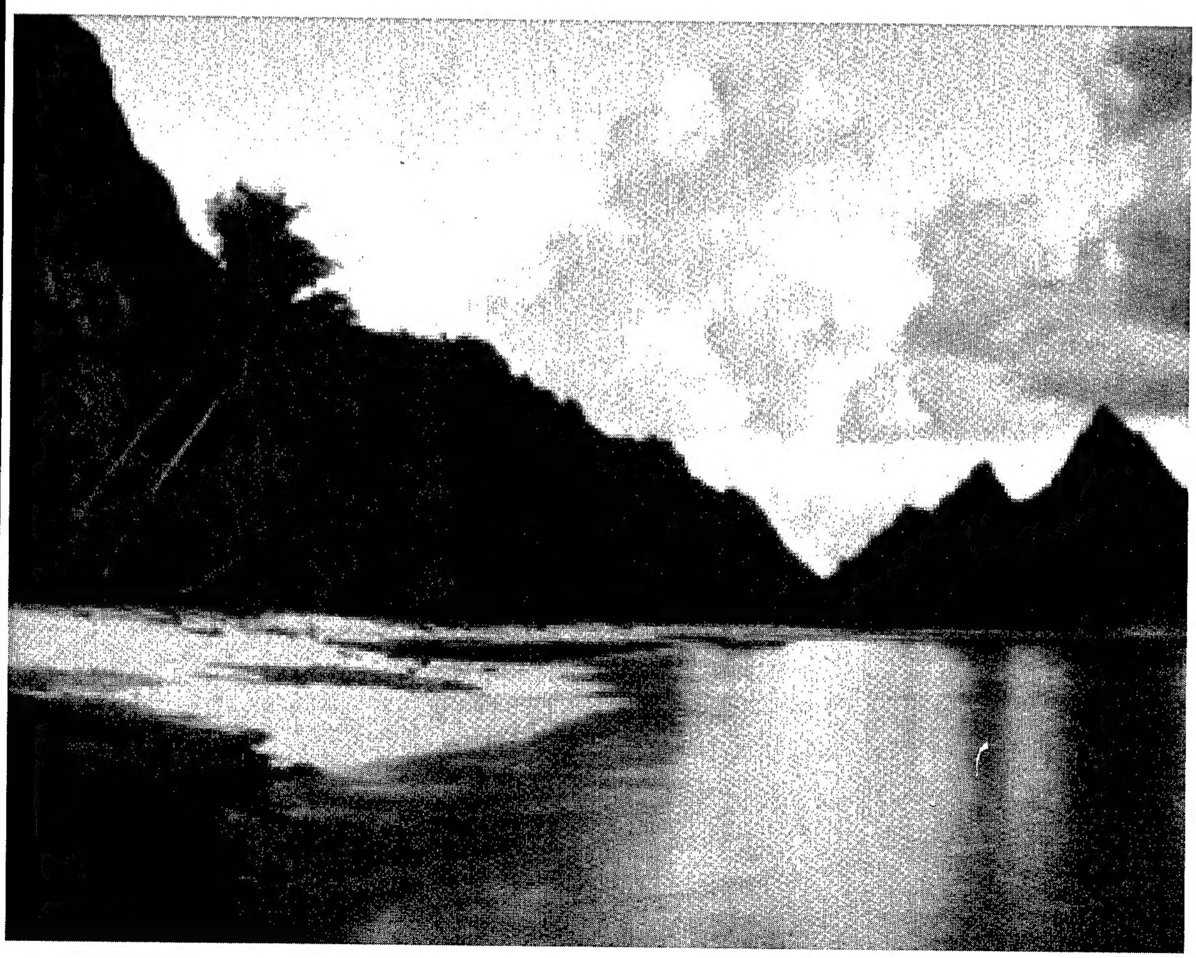
January 2003



Coastal and Hydraulics Laboratory

Technical Report CHL-98-33 Revised
January 2003

Hurricane-Induced Stage-Frequency Relationships for the Territory of American Samoa

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Final report

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Conversion Factors, Non-SI to SI Units of Measurement

Multiply	By	To Obtain
degrees (angle)	0.01745329	radians
feet	0.3048	meters
inches	2.54	centimeters
knots (international)	0.5144444	meters per second
miles (U.S. statute)	1.609345	kilometers
square feet	0.09290304	square meters
square miles	2,589,988	square meters

Preface

This report describes the procedures and results of a hurricane stage-frequency analysis for five islands of the U.S. Territory of American Samoa. The study was performed by the U.S. Army Engineer Research and Development Center (ERDC), Coastal and Hydraulics Laboratory (CHL) for the U.S. Army Engineer District, Honolulu.

The investigation reported herein was conducted by Dr. Adele Militello, formerly of the Coastal Hydrodynamics Branch (CHB), CHL, and presently of Coastal Analysis LLC, Dr. Norman W. Scheffner, of the Estuarine Engineering Branch, CHL, and Dr. Edward F. Thompson, of the Coastal Harbors and Structures Branch (CHSB), CHL. Mr. Mitchell E. Brown of CHL assisted with model runs. The final report was prepared by Drs. Militello, Scheffner, and Thompson. Mr. Steven H. Yamamoto, Civil Works Branch, the Honolulu District, was the study manager and point of contact.

This study was performed under the general supervision of Mr. Thomas R. Richardson, Director, CHL. Direct supervision of this project was provided by Dr. Martin C. Miller, former Chief, CHB, and Mr. Dennis G. Markle, Chief, CHSB.

At the time of publication of this report, Dr. James R. Houston was Director of ERDC, and COL John W. Morris III, EN, was Commander and Executive Director.

1 Introduction

The Territory of American Samoa consists of seven islands located in the South Pacific Ocean at approximately 170 W longitude and 14 S latitude. The Islands lie east-northeast of Australia and northeast of New Zealand as shown in Figure 1. This low-latitude location is favorable for tropical storm and hurricane formation and passage. During the period 1987 through 1991, extensive damage from three hurricanes was incurred. Storm damage included: village damage and destruction, road washout, harbor destruction, and crop damage (Sea Engineering, Inc. and Belt Collins Hawaii 1994). The present study was undertaken to calculate hurricane stage-frequency hydrographs for five of the seven islands. The development of the storm-surge hydrographs will provide information for planning and mitigation strategies to reduce the impact of future storms in the study area.

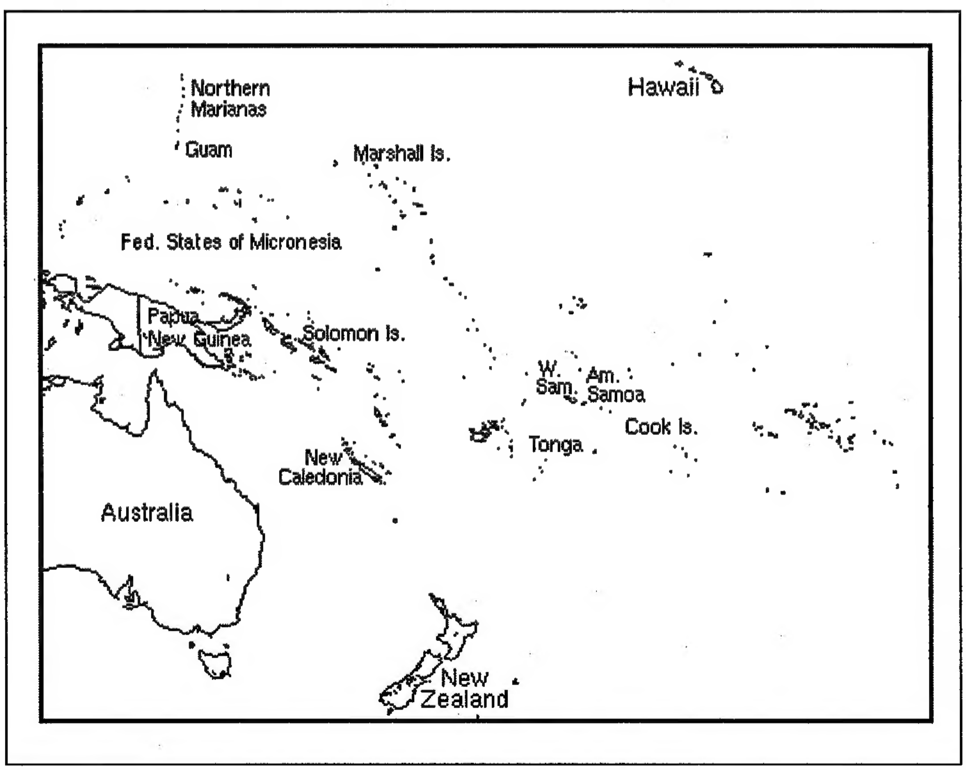

Figure 1. Location map of study area

The islands Tutuila, Aunuu, Ofu, Olosega, and Tau, comprise the area of study (see Figure 2) and together cover an area of 77 sq mi (199 sq km). Tutuila is the largest of the five islands. The Manu'a Group, consisting of Ofu, Olosega, and Tau, are located 60 mi (160 km) east of Tutuila and Aunuu. All five islands are volcanic, with typically narrow coastal areas and steep mountains. Fringing coral reefs are common around the islands and can extend to 2,000 ft (610 m) out from the shoreline (Sea Engineering, Inc. and Belt Collins Hawaii 1994). These reefs are typically very shallow and some are exposed at low tide.

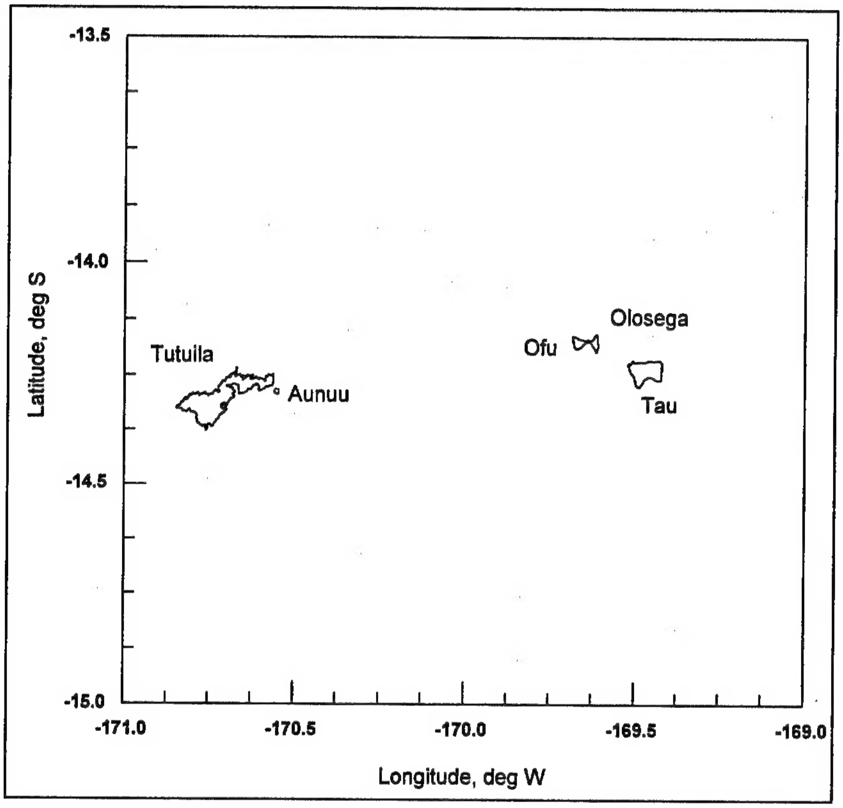

Figure 2. Site map showing the five islands of study

Pago Pago Harbor is the major embayment of the study site and is located on the southern side of Tutuila (see Figure 3). The harbor is deep, with typical depths of 200 ft (60 m) along the its main axis. Tuna canneries, a wharf, and government buildings are located on the harbor shores. Smaller embayments exist on Tutuila and most are located on the north shore of the island. Aunuu and the Manu'a Group lack natural embayments, although small harbors (Aunuu Small Boat Harbor, Ofu Harbor, and Tau Small Boat Harbor) have been constructed by the US Army Corps of Engineers.

Although most of the inhabitants of American Samoa live on Tutuila Island, villages are located in low-lying coastal areas on all five islands. The risk of inundation is greatest in these regions because of their low relief and exposure to storm waves.

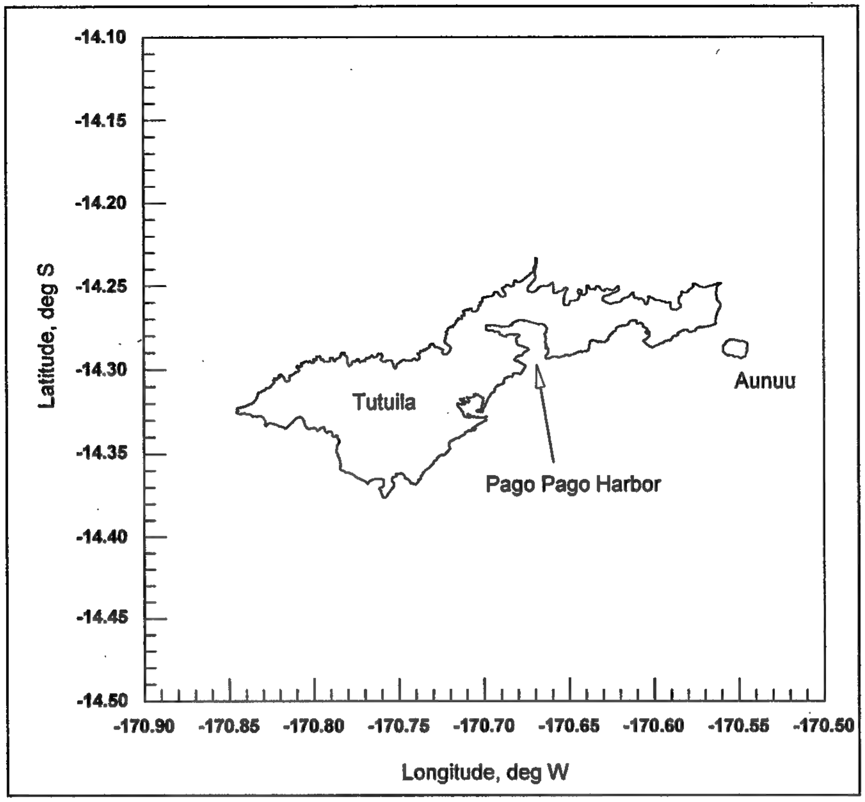

Figure 3. Islands of Tutuila and Aunuu

This report describes the procedures and results of a hurricane stage-frequency analysis for the island coastlines of the U.S. Territory of American Samoa. Many of the techniques employed in this study have been successfully applied in previous stage-frequency analyses (Mark 1996, Mark and Scheffner 1997). The analysis for this study consisted of five tasks. The first task was the development of a hurricane database for the western south Pacific Ocean and analysis of storm statistics and correlations. Storms impacting the study area were selected from the database to create a smaller, representative group of storms called the "training set." A planetary boundary layer model was applied to calculate wind and atmospheric pressure fields for each storm in the training set.

The second task consisted of simulation of storm surge by application of a long-wave, finite-element hydrodynamic model. For each storm in the training set, storm surge was calculated at specified sites in the study area. The third task consisted of wave parameter calculation for each storm by application of a wave model and a wave-transformation model. The fourth task consisted of time-series calculation of ponding level, setup, and runup for each storm. These calculations were performed for profiles specified by CEPOH.

The fifth task was the development of frequency-of-occurrence relationships for water level. These relationships were developed by application of the empirical simulation technique (EST) to relate hurricane parameters and the corresponding storm-surge elevations. The EST is a statistical resampling

procedure that applies historical data to develop joint probability relationships among the various measured storm parameters (e.g., maximum wind speed). The resampling scheme generates large populations of data that are statistically similar to a much smaller database of historical events, i.e. the training set of storms. Application of the EST to the expanded storm set produces a database of peak storm-surge elevations by simulating multiple-year periods (e.g. 200-year periods) of storm activity a multiple number of times. Stage-frequency relationships are then calculated from the database of peak storm-surge elevations.

This report is divided into six chapters. Chapter 1 is the Introduction. Chapter 2 describes the EST. Chapter 3 describes the meteorological, wave, and long-wave hydrodynamic models. Chapter 4 discusses model calibration, validation, and implementation. Chapter 5 gives the methods of calculation for stage-frequency relationships. Chapter 6 provides the summary and conclusions of the study. Appendix A contains a listing of station locations for storm surge calculations. Appendix B shows which storm surge station was used for each coastal profile. Appendix C gives stage-frequency relationship tables. Appendix D contains tables of wave parameters and water level components that correspond to peak water level for each training set storm at each coastal profile. Appendix E shows hurricane track plots for storms contained in the training set.

2 Empirical Simulation Technique

Storm damage reduction programs and design of coastal structures typically require a storm-surge analysis to obtain a peak water-surface elevation for design water levels. Because hurricanes occur infrequently at a given site, abundant storm-surge stages are generally not available such that standard ranking methods cannot be applied in stage-frequency analysis. Thus, numerical models are often applied for simulating a larger population of storm-surge events. Traditionally, modeled hurricanes are synthesized via a joint probability method (JPM) to describe storm attributes, such as maximum wind speeds and pressure deficits. A set of hypothetical hurricanes is built from a combination of hurricane parameter values obtained by statistical analysis of historical storms.

The JPM requires that all parameters are statistically independent. However, storm parameters are not statistically independent and the assumption that they are independent leads to errors when the JPM approach is taken. Because storm parameters are related, random grouping of parameters can cause simulation of storms that may not occur in nature. For example, one parameter may be assigned a value typical of a weak storm, whereas a second parameter may be assigned a value representative of an intense storm. Thus, a level of uncertainty is introduced into the stage-frequency computations. For this study, an alternative approach, the EST, has been taken. The EST preserves the interdependence of hurricane parameters, which is an advantage over the JPM. Details of the EST are given in Scheffner et al. (1999), Borgman et al. (1992), and Scheffner and Borgman (1993).

Description of Technique

EST is a statistical resampling technique that uses historical data to develop joint probability relationships among the various measured storm parameters. In contrast to the JPM discussed above, there are no simplifying assumptions concerning the development of the probability density functions describing historical events. Thus, the interdependence of parameters is maintained. In this manner, parameter probabilities are site-specific, do not depend on fixed parametric relationships, and do not assume parameter independence. Thus the EST is distribution-free and nonparametric.

For this study, the EST was developed to generate numerous multi-year intervals of possible future hurricane events for the study site. The ensemble of modeled or simulated events is consistent with the statistics and correlations of past storm activity at the site. Furthermore, the EST permits random deviations in storm behavior (when compared to historic events) that could occur in the future. For example, simulated hurricanes are permitted to make landfall at locations other than those made by historical storms. These random deviations can also result in more intense storms than the historical events themselves, allowing for the possibility of a future hurricane being the storm of record.

The simulation approach requires specifying a set of parameters that describes the dynamics of some physical system, such as hurricanes. These parameters, which must be descriptive of both the physical process being modeled and the effects of that process, are defined as an N-dimensional vector space. The parameters that describe the physical attributes of the process are referred to as input vectors. For example,

$$\underline{v} = (v_1, v_2, v_3, \ldots, v_N) \tag{1}$$

In the case of hurricanes, pertinent input vectors include: the central pressure deficit, the radius to maximum winds, minimum distance from the eye of the storm to the location of interest, forward speed of the eye, and the tidal phase during the event. These values can be defined for each specific location and correspond to each particular historical or hypothetical event of the total set of storm events used in the study.

The second class of vectors involve some selected response resulting from the N-dimensional parameterized storm, i.e.,

$$\underline{r} = (r_1, r_2, r_3, \ldots, r_M) \tag{2}$$

For hurricanes, response vectors can include maximum storm surge, shoreline erosion, dune recession, wind-generated wave height and period, bottom erosion, or any response that can be attributed to the passage of the storm. The maximum total water-surface elevation, resulting from the combined tide and storm surge, is the response vector of interest.

Although response vectors are related to input vectors

$$v \Rightarrow r \tag{3}$$

the interrelationship is highly nonlinear and involves correlation relationships which cannot be directly defined, i.e., a nonparametric relationship. For example, in addition to the storm-input parameters, storm surge is a function of local bottom topography, shoreline slope and exposure, ocean currents, etc., as well as their spatial and temporal gradients. It is assumed that these combined properties are implicit in the response vector. For the case of storm surge along

the coast of the American Samoa islands, atmospheric and hydrodynamic models are applied to compute response vectors as a function of the input vectors and local bottom topography together with shoreline configuration. Other response vectors such as sediment transport, shoreline response, and dune recession require application of additional models.

Historical data for storms can be characterized as

$$[v_i; i = 1, \ldots, I] \tag{4}$$

where I is the number of historical storm events. For example, let v_i have d_v components

$$v_i = \Re^{d_v} \tag{5}$$

where $\Re^{d_v}$ denotes a d_v-dimensional space. From this historical data set, a subset of storm events is selected

$$[v_j^*, j = 1, \ldots, J] \tag{6}$$

where J is the number of historical storms contained in the subset. The subset of storms is representative of the entire set of historical storms and is referred to as the "training set." Furthermore, those storms comprising the training set are subsequently used as input to numerical models for computing the desired response vectors. The set of v_j^* usually includes historical events but may include historical storms with a deviation or perturbation, such as a hurricane with a slightly altered path. Some historical events may also be deleted from the training set if two events are nearly identical such that both would produce the same response. Because the purpose is to fill parameter space $\Re$, two similar events are redundant.

The training set of storms can be augmented with additional storms contained in the historical data set. Storm events augmenting the training set are referred to as the "statistical set" of storms. Whereas numerical models are used for calculating response vectors for those events in the training set, response vectors for the statistical set of storms are interpolated using the training set response vectors. Thus, stage-frequency relationships can be generated using the entire historical data set without need of simulating all storms in that data set.

With the augmented storm data set (i.e., training and statistical storm sets), the EST produces N simulations of a T-year sequence of events (hurricanes), each with their associated input vectors and response vectors. Because there are N-repetitions of a T-year sequence of events, an error analysis of the results can be performed with respect to median, worst, least, standard deviation, etc. The

following describes the procedures by which the input and response data are used to produce multiple simulations of multiple years of events.

Empirical Simulation

Two criteria are required of the T-year sequence of events. The first criterion is that the individual events must be similar in behavior to historical events in order that the interrelationships among the input and response vectors remain realistic. For example, a hurricane with a high central pressure deficit and low maximum winds is not a reasonable event – the two parameters are not independent although their exact dependency is unknown.

Simulation of realistic events is accounted for in the nearest-neighbor interpolation resampling technique developed by Borgman et al. (1992). The basic technique can be described in two dimensions as follows. Let $X_1, X_2, X_3, \ldots, X_n$ be n independent, identically distributed random vectors (storm events), each having two components $[X_i = \{\underline{x}_i(1), \underline{x}_i(2)\};\ i = 1, n]$. Each event X_i has a probability p_i as $1/n$; therefore, a cumulative probability relationship can be developed in which each storm event is assigned a segment of the total probability of 0.0 to 1.0. If each event has an equal probability, then each event is assigned a segment s_j such that $s_j \rightarrow X_j$ and has probabilities defined by

$$
\begin{array}{l}
\left[0 < s_1 \le \frac{1}{n}\right] \\
\left[\frac{1}{n} < s_2 \le \frac{2}{n}\right] \\
\left[\frac{2}{n} < s_3 \le \frac{3}{n}\right] \\
\quad \cdot \\
\quad \cdot \\
\quad \cdot \\
\left[\frac{n-1}{n} < s_n \le 1\right]
\end{array}
\tag{7}
$$

A storm event is identified by random sampling from the total storm population. The procedure is equivalent to drawing and replacing random samples from the full storm event population.

The EST is not simply a resampling of historical events technique, but rather an approach intended to simulate the vector distribution contained in the training set population. The EST approach is to select a sample storm based on a random walk from the event X_i with x_1 and x_2 response vectors to the nearest neighbor

vectors. The walk is based on independent uniform random numbers with the range of (-1,1) and has the effect of simulating responses that are not identical to the historical events but are similar to events that have historically occurred.

Because simulated events correspond to a specific location, the second criterion to be satisfied is that the total number of storm events selected in the T-years must be statistically representative of the number of historical events that have occurred at the area of study. For this study, 31 hurricane events were identified that passed within 200 mi (370 km) of the American Samoa islands during the 37-year period extending from 1958 to 1995. Given the mean frequency of storm events for a particular region, a Poisson distribution is used to determine the average number of expected events in a given year. For example the Poisson distribution can be written as

$$\Pr(s;\lambda)=\frac{\lambda^{s}e^{-\lambda}}{s!} \tag{8}$$

for $s=0,1,2,3,\ldots$ The probability $\Pr(s;\lambda)$ defines the probability of having s events per year where λ is a measure of the historically based number of events per year. For this study, λ was computed to be 0.84 (31/37).

Output from the EST program is N repetitions of T-years of simulated storm event responses. It is from these responses that frequency-of-occurrence relationships are computed. The computational procedure followed is based on the generation of a probability distribution function corresponding to each of the T-year sequences of simulated data.

Recurrence Relationships

Estimates of frequency-of-occurrence begin with the calculation of a probability distribution function (pdf) for the response vector of interest. Let $X_1, X_2, X_3, \ldots, X_n$ be n independent, identically distributed, random response variables with a cumulative pdf given by

$$F_x(x)=\Pr[X\le x] \tag{9}$$

where $\Pr[X\le x]$ represents the probability that the random variable X is less than or equal to some value x, and $F_x(x)$ is the cumulative probability density function ranging from 0.0 to 1.0. The problem is to estimate the value of F_x without introducing some parametric relationship for probability. The following procedure is adopted because it makes use of the probability laws defined by the data and does not incorporate any prior assumptions concerning the probability relationship.

Assume a set of n observations of data. The n values of x are first ranked in order of increasing size. In the following analysis, the parentheses surrounding the subscript indicate that the data have been rank-ordered. The value $x_{(1)}$ is the smallest in the series and $x_{(n)}$ represents the largest value. Let r denote the rank of the value $x_{(r)}$ such that rank $r = 1$ is the smallest and rank $r = n$ is the largest.

An empirical estimate of $F_X\left(x_{(r)}\right)$, denoted by $\hat{F}_X\left(x_{(r)}\right)$, is given by Gumbel (1954) (see also Borgman and Scheffner (1991) and Scheffner and Borgman (1993)) as

$$\hat{F}_X\left(x_{(r)}\right) = \frac{r}{(n+1)} \tag{10}$$

for $\left\{x_{(r)}, r = 1,2,3,\ldots,n\right\}$. This form of estimate allows for future values of x to be less than the smallest observation $x_{(1)}$ with probability of $1/(n+1)$, and to be larger than the largest values $x_{(n)}$ with probability $m/(n+1)$.

An example set of 10 years of observed elevations, the rank ordered set of observations, the rank, and the cumulative pdf are shown in Table 1. As can be seen in the table, this form of the cumulative distribution function allows for values of x to be greater than the maximum or less than the minimum observed values in the historical database. A plot of the cumulative distribution function versus $x_{(r)}$ as computed by Equation 10 is shown in Figure 4. In the implementation of the EST, tail functions (Borgman and Scheffner 1991) are applied to define the pdf for events larger than the largest or smaller than the smallest observed event so that there is no discontinuity in the pdf.

Table 1
Sample Distribution Function Calculation

Year	$X_{1,2,\ldots,n}$	$X_{(r)}$	Rank r	$\hat{F}_x\left(X_{(r)}\right)$
1	3.2	10.5	10	0.91
2	3.5	8.6	9	0.82
3	8.0	8.0	8	0.73
4	1.0	7.5	7	0.64
5	10.5	5.9	6	0.55
6	5.9	4.1	5	0.45
7	8.6	3.5	4	0.36
8	4.1	3.2	3	0.27
9	2.3	2.3	2	0.18
10	7.5	1.0	1	0.10

The cumulative pdf as defined by Equation 10 and shown in Figure 4 is applied to develop stage-frequency relationships as follows. Consider that the cumulative probability for an n-year return period storm can be written as

$$F(n) = 1 - \frac{1}{n} \tag{11}$$

where $F(n)$ is the simulated cumulative probability of occurrence for an event with a return period of n years. Frequency-of-occurrence relationships are obtained by linearly interpolating a stage from Equation 10 corresponding to the pdf associated with the return period calculated by Equation 11.

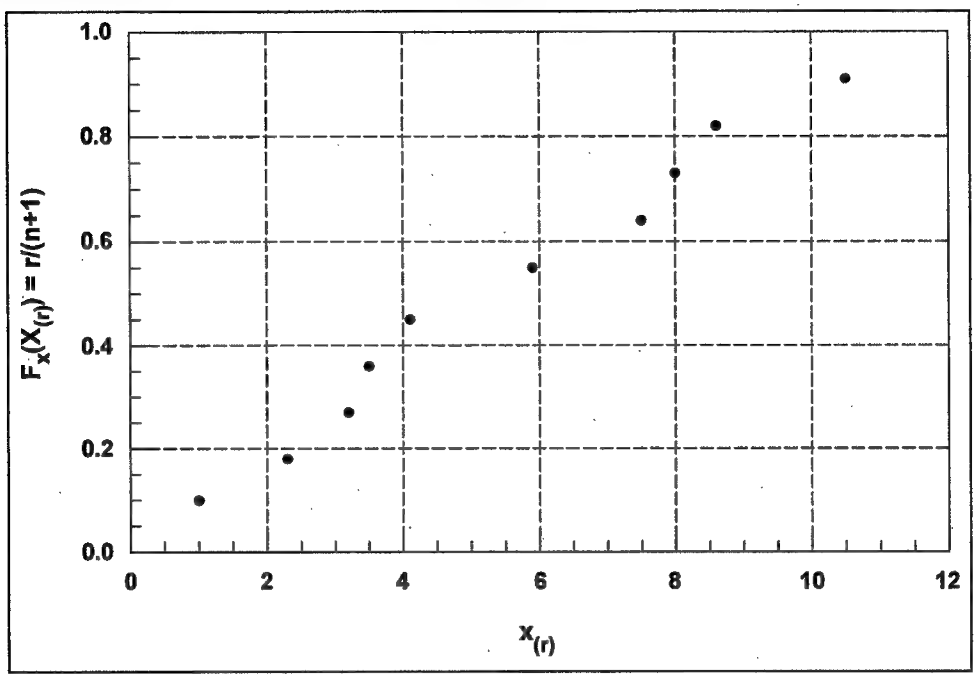

Figure 4. Example of cumulative probability distribution plot

3 Description of Numerical Models

Calculation of hurricane stage-frequency relationships for the U.S. Territory of American Samoa requires application of four numerical models. The Planetary Boundary Layer (PBL) model simulates hurricane-induced wind and atmospheric pressure fields for those hurricanes that have impacted the study area. The wind-wave model WISWAVE applies the calculated wind fields to determine the deep-water wave parameters. The wave-transformation model WAVTRAN transforms the deep-water waves calculated by WISWAVE by a spectral spreading technique. Wave transformation within the Pago Pago Harbor embayment, a complex, highly-sheltered area where WAVTRAN is not easily applied, is calculated by taking advantage of CGWAVE model results from a recent harbor study (Thompson and Demirbilek 2002). These wave parameters are subsequently used to calculate wave setup, runup, and ponding level. The long-wave hydrodynamic model ADCIRC applies the calculated wind and pressure fields to obtain peak water levels for storm surge events. Descriptions of the wind and atmospheric pressure model, the wave and wave-transformation models, and the hydrodynamic model are presented below.

Wind and Atmospheric Pressure Field Model

The Planetary Boundary Layer (PBL) numerical model was selected for simulation of hurricane-generated wind and atmospheric pressure fields. The model applies the vertically averaged primitive equations of motion for predicting hurricane wind velocities. The model includes parameterization of the momentum, heat, and moisture fluxes together with surface drag and roughness formulations. Through hindcast applications, Cardone, Greenwood, and Greenwood (1992) found that the PBL model calculates accurate surface wind speeds and directions as compared to measurements collected in hurricanes over open water.

The PBL model requires a set of "snapshots" for input. The snapshots consist of meteorological storm parameters that define the storm at various stages in its development or at particular times during its life. These parameters include: latitude and longitude of the storm's eye; track direction and forward speed measured at the eye; radius to maximum winds; central and peripheral atmospheric pressures; and an estimate of the geostrophic wind speed and

direction. Also, the direction and speed of steering currents can be provided for representing asymmetric hurricanes.

For application to the American Samoa study site, the PBL model was upgraded to calculate storm wind and pressure fields for the Southern Hemisphere. Prior to the present study, the model had not been applied in the Southern Hemisphere and an upgrade was required for correct calculation of wind direction. Upon completion of the upgrade, the calculated wind fields were verified for directional accuracy.

Storm parameters were obtained from a database developed by the National Oceanic and Atmospheric Administration's (NOAA) National Hurricane Center (NHC). The present database contains hurricanes and tropical storms that occurred in the south Pacific Ocean from 1958 through 1995, a period of 37 years. Information contained in this database is provided at 0000, 0600, 1200, and 1800 hr Greenwich Mean Time (GMT), and includes: latitude and longitude of the storm, central pressure, and maximum wind speed. For some storms, data for maximum wind speed were not available. An empirical approximation was developed to estimate the maximum wind speed where these data were missing.

An empirical approximation for hurricane wind speed was developed through modification of published relationships between maximum wind speed and central pressure. The new approximation is given by

$$W = \left(1.74 + \beta \frac{P_a}{P_c}\right)(P_c - P_a)^{\alpha} \tag{12}$$

where W is the maximum wind speed, P_a is the ambient pressure, P_c is the central pressure, and α and β are empirically-determined coefficients. The multiplier for the pressure deficit is variable and changes with the ratio of ambient to central pressure. The pressure ratio is effectively a scaling parameter for the multiplier and compounds the influence of decreasing central pressure on the wind speed estimate.

Tests of the approximation were performed for 6991 data points obtained from the HURDAT database for the western south Pacific Ocean. The best fit between the measured and approximated wind speed was found for $\alpha = 0.671$ and $\beta = 1.41$. The ambient pressure was taken to be 1013 mb. Figure 5 shows the measured and calculated wind speed. The solid line in Figure 5 plots $measured = calculated$ wind speed. Maximum error occurs at low wind speed. For wind speeds above about 66 ft/s (20 m/s) the error is small, typically under 3 ft/s (1 m/s). For the test data set, the average absolute deviation of approximated wind speed from measured wind speed was 2.6 ft/s (0.8 m/s). The maximum overprediction was 9.2 ft/s (2.8 m/s) and corresponded to a measured wind speed of 26 ft/s (8 m/s). The maximum underprediction was 17.1 ft/s (5.2 m/s) and corresponded to a measured wind speed of 39 ft/s (12 m/s).

Estimated wind speeds from published relationships (Kraft 1961; Atkinson and Holliday 1977) were compared to those calculated by the approximation given by Equation 12. The new approximation was found to give more accurate estimates of wind speed than the published approximations for measured wind speed greater than 65 ft/s (20 m/s). The ambient pressure applied in the Atkinson and Holliday (1977) approximation for the north Pacific was 1010 mb, but was modified for this analysis to be 1013 mb. Average absolute deviations were 10.2 ft/s (3.1 m/s) and 6.9 ft/s (2.1 m/s) for the Kraft (1961) and Atkinson and Holliday (1977) approximations, respectively.

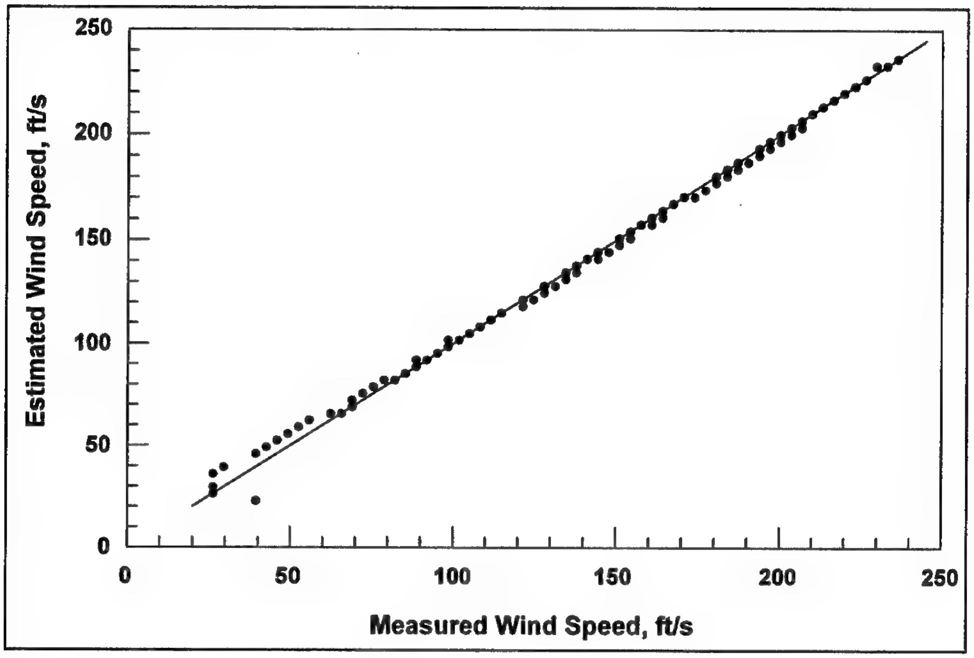

Figure 5. Measured vs. estimated wind speed

Radius to maximum winds (RMW) is approximated by application of a function relating the maximum wind speed and the atmospheric pressure deficit (Jelesnianski and Taylor 1973). Track directions and forward speeds required by the PBL model are approximated by cubic spline interpolation at hourly intervals from the 6-hour coordinate positions provided in the database. Peripheral atmospheric pressures were assumed equal to 1013 mb, and geostrophic wind speeds were specified as 6 knots.

The spatial area covered by a hurricane at a given time is specified in the model to correspond to a set of nodes on a numerical grid. Wind velocities and atmospheric pressure values are computed at each node in the grid. Whereas some models employ a fixed grid system to simulate a hurricane (i.e., stationary grid with a moving storm), the PBL model simulates the hurricane as a stationary storm with a moving grid. A hurricane's forward motion is calculated as the vector sum of the forward and rotational velocity vector components. The numerical grid is moved under the storm at the calculated forward velocity at each time step.

The distribution of wind speed and radial change in wind speed varies spatially within a hurricane such that higher spatial resolution of the wind field is required in the central region of the storm, whereas coarser resolution is required on the outer areas. To provide spatially-graded resolution of the wind field, a nested gridding technique is applied consisting of five layers or subgrids. The grid nesting is applied such that all subgrids contain the same number of nodes, however, the spatial coverage and resolution differs and is successively graded. Each subgrid is composed of 21 by 21 nodes in the x- and y-directions, respectively. The centers of all subgrids lie on node (11,11), defined at the eye of the hurricane. For this study, the subgrid with the finest resolution had an incremental distance of 3.1 mi (5 km) between nodes and covered an area of 3861 sq mi (10,000 sq km). Incremental distances for the remaining subgrids were 6.2, 12.4, 24.9, and 49.7 mi (10, 20, 40, and 80 km) and their areas of coverage were 15,444, 61,776, 247,104, and 988,428 sq mi (40,000, 160,000, 640,000, and 2,560,000 sq km), respectively.

For each snapshot, the equations of motion are first solved for the subgrid covering the greatest area. Computed wind velocities are then applied as boundary conditions on the second-largest grid, and the equations are solved again. This procedure is followed for the remaining grids where wind fields are computed on successively smaller grids. Thus, the nested grid technique provides wind field information over a wide spatial area while sufficient grid resolution is provided to accurately compute winds in the vicinity of the hurricane eye.

After all snapshots have been processed, hourly wind and atmospheric pressure fields are interpolated using a nonlinear blending algorithm which produces a smooth transition from one snapshot to the next. Hourly wind and pressure fields are then interpolated from the PBL grid onto the hydrodynamic grid and subsequently stored for use by the hydrodynamic model.

Wave and Wave Transformation Models

Deep-water wave fields were calculated by application of the Wave Information Studies Wave (WISWAVE) model (Resio and Perrie 1989). This model is a second-generation discrete directional spectral wave model in which the spectral wave computations are based on the integration of energy over the discrete frequency spectrum. Model output includes time series of significant wave height, peak (dominant) or mean wave period, and mean wave direction. Peak or dominant wave periods are not integral quantities in that they are not derived by summation over the spectrum. Peak period is defined as the period associated with the mid-band frequency, or that frequency band containing the largest spectral energy density. Mean wave period is an energy-weighted quantity integrated over all user-specified frequencies of interest. Model input includes a rectilinear computational grid, with water depths specified at each node, and wind speed and direction over the grid domain.

Application of the wave model required sufficient resolution of the grid such that calculation points could be distributed around and near to the islands so that representative wave conditions would be captured for all sides of the islands. To meet this requirement, a grid with constant spacing of 0.083 deg was developed. Grid bathymetry was taken from that specified in the storm surge grid (described below) and interpolated onto the wave grid. The method of kriging was applied for the interpolation. The islands of Western Samoa and American Samoa were specified as land in the grid for accurate calculation of wave sheltering and refraction. Details of the grid are given in Table 2.

Table 2
WISWAVE Grid Parameters

Parameter	Value
Longitude limits	-173.987 W , -165.961 W
Latitude limits	18.254 S, 10.238 S
Cell side length	0.083 deg
Total number of nodes	9604
Number of nodes in North-South direction	98
Number of nodes in East-West direction	98

Wind forcing for the wave model was calculated by application of the PBL model. Data for selected storms were taken from the HURDAT database for the south Pacific Ocean. Wind speed and direction were calculated for each point on the wave grid at 1-hr intervals.

Deep-water wave parameters calculated by the wave model were stored at 32 stations surrounding the American Samoa Islands for each of the 31 storms in the training set (described in Chapter 5). A list of these stations is given in Table 3. The duration of the wave simulations corresponded to the time coverage of each storm in the HURDAT database. Wave parameters were stored at 1-hr intervals. These deep-water waves were transformed by application of the WAVTRAN model, then applied to calculations of ponding level, setup, and runup.

The WAVTRAN model calculates the spectral transformation of waves during propagation from one depth to another, taking into account shoreline orientation and wave sheltering (Jensen 1983, Gravens et al. 1991). The model assumes that sea and swell waves have an energy spectrum that follows the TMA spectral form (Bouws et al. 1985). Directional spread is calculated by 4^{th} and 8^{th} power cosine functions. The wave transformation calculation is dependent on the shoreline orientation because the bottom contours are assumed parallel to the shoreline. If wave sheltering is included, waves coming from directions specified by a sheltered angle band are deleted from the spectrum. Details of the model application for this study are given in Chapter 5.

Table 3
Deepwater Wave Stations

Station Number	Latitude, deg S	Longitude, deg W
1	14.45	170.93
2	14.37	170.93
3	14.29	170.93
4	14.20	170.93
5	14.20	170.84
6	14.20	170.76
7	14.20	170.68
8	14.20	170.60
9	14.20	170.51
10	14.20	170.43
11	14.29	170.43
12	14.37	170.43
13	14.37	170.51
14	14.37	170.60
15	14.37	170.68
16	14.45	170.68
17	14.45	170.76
18	14.45	170.84
19	14.29	169.68
20	14.20	169.68
21	14.12	169.68
22	14.12	169.60
23	14.12	169.52
24	14.12	169.44
25	14.20	169.44
26	14.29	169.44
27	14.20	169.35
28	14.29	169.35
29	14.29	169.52
30	14.29	169.60
31	14.20	169.77
32	14.12	169.77

For locations inside the Pago Pago Harbor embayment, results from the recent CGWAVE model study by Thompson and Demirbilek (2002) were used to compute wave transformation, rather than the less-refined WAVTRAN approach. Details of the CGWAVE model study are given by Thompson and Demirbilek (2002).

Storm Surge Model

The ADvanced CIRCulation (ADCIRC) numerical model was applied for simulation of the long-wave hydrodynamic processes in the study area. The model calculates a two-dimensional, depth-integrated finite-element solution of the Generalized Wave-Continuity Equation (GWCE). The fundamental components of the GWCE are the depth-integrated continuity and Navier-Stokes equations for conservation of mass and momentum. The assumption of incompressibility and the Boussinesq and hydrostatic pressure approximations were applied. The primitive, non-conservative form of the governing equations, given in spherical coordinates, as applied in the model are (Flather 1988; Kolar et al. 1993)

$$\frac{\partial \zeta}{\partial t}+\frac{1}{R\cos(\phi)}\left[\frac{\partial UD}{\partial \varphi}+\frac{\partial(UV\cos(\phi))}{\partial \phi}\right]=0 \tag{13}$$

$$\begin{aligned}&\frac{\partial U}{\partial t}+\frac{1}{R\cos(\phi)}U\frac{\partial U}{\partial \varphi}+\frac{1}{R}V\frac{\partial U}{\partial \phi}-\left[\frac{\tan(\phi)}{R}U+f\right]V\\&=-\frac{1}{R\cos(\phi)}\frac{\partial}{\partial \varphi}\left[\frac{P_S}{\rho_0}+g(\zeta-\xi)\right]+\frac{\tau_{S\varphi}}{\rho_0 D}-\tau_* U\end{aligned} \tag{14}$$

$$\begin{aligned}&\frac{\partial V}{\partial t}+\frac{1}{R\cos(\phi)}U\frac{\partial V}{\partial \varphi}+\frac{1}{R}V\frac{\partial V}{\partial \phi}-\left[\frac{\tan(\phi)}{R}U+f\right]U\\&=-\frac{1}{R\cos(\phi)}\frac{\partial}{\partial \phi}\left[\frac{P_S}{\rho_0}+g(\zeta-\xi)\right]+\frac{\tau_{S\phi}}{\rho_0 D}-\tau_* V\end{aligned} \tag{15}$$

where t is time, φ is degrees longitude (east of Greenwich is taken positive), ϕ is degrees latitude (north of the equator is taken positive), ζ is the free-surface elevation relative to the geoid, U is the depth-averaged velocity component parallel to the East-West axis, V is the depth-averaged velocity component parallel to the North-South axis, R is the radius of the Earth, $D=\zeta+h$ is the total water-column depth, h is the ambient depth relative to the geoid, $f=2\Omega\sin(\phi)$ is the Coriolis parameter, Ω is the angular speed of the Earth's rotation, P_S is the atmospheric pressure at the free surface, g is the acceleration due to gravity, ξ is the effective Newtonian equilibrium tide potential, ρ_0 is the reference density of water, $\tau_{S\varphi}$ and $\tau_{S\phi}$ are the applied free-surface stresses, and τ_* is the bottom stress given by $C_f\left(U^2+V^2\right)^{1/2}/D$ where C_f is the bottom-friction coefficient.

The time-differentiated form of the conservation of mass equation is combined with a space-differentiated form of the conservation of momentum equation to develop the GWCE (Westerink et al. 1992) given by

$$
\begin{aligned}
&\frac{\partial^2 \zeta}{\partial t^2} + \tau_0 \frac{\partial \zeta}{\partial t} - \frac{1}{R\cos(\phi)} \frac{\partial}{\partial \varphi}\left[\frac{1}{R\cos(\phi)} \left(\frac{\partial (DUU)}{\partial \varphi} + \frac{\partial (DUV\cos(\phi))}{\partial \phi} \right) - UVD \frac{\tan(\phi)}{R} \right] \\
&\left[-2\omega \sin(\phi) DV + \frac{D}{R\cos(\phi)} \frac{\partial}{\partial \varphi}\left(g(\zeta - \alpha\xi) + \frac{P_S}{\rho_0} \right) + \tau_* DU - \tau_0 DU - \frac{\tau_{S\varphi}}{\rho_0} \right] \\
&- \frac{1}{R} \frac{\partial}{\partial \phi}\left[\frac{1}{R\cos(\phi)} \left(\frac{\partial DVV}{\partial \varphi} + \frac{\partial DVV\cos(\phi)}{\partial \phi} \right) + UUH \frac{\tan(\phi)}{R} + 2\omega \sin(\phi) DU \right] \\
&- \frac{1}{R} \frac{\partial}{\partial \phi}\left[\frac{D}{R} \frac{\partial}{\partial \phi}\left(g(\zeta - \alpha\xi) + \frac{P_S}{\rho_0} \right) + (\tau_* - \tau_0) DV - \frac{\tau_{S\phi}}{\rho_0} \right] \\
&- \frac{\partial}{\partial t}\left[\frac{VD}{R} \tan(\phi) \right] - \tau_0 \left[\frac{VD}{R} \tan(\phi) \right] = 0
\end{aligned}
\tag{16}
$$

The ADCIRC model solves the GWCE (Equation (16)) in conjunction with the primitive momentum equations given by Equations (14) and (15).

The GWCE-based solution scheme eliminates several problems associated with finite-element models that solve the primitive forms of the continuity and momentum equations (i.e. Navier-Stokes equations), including spurious modes of oscillation and artificial damping of the tidal signal. Forcing functions include time-varying water-surface elevation, wind stress, atmospheric pressure, and the Coriolis effect.

The computational grid developed for this study is a large-domain circular grid with a radius of 4 deg (276 mi) and center at 170 deg W longitude and 14.25 deg S latitude. The American Samoa islands are located in the central region of the grid. The large scale of the grid has two main advantages. First, the tidal forcing boundaries are far from the region of interest such that island shorelines are free from boundary effects. Second, because hurricanes are large-scale atmospheric phenomena, a large-domain grid is preferred to maximize the interaction of the horizontal storm area with the computational grid, as well as the storm track.

The grid developed for this study is shown in Figure 6. Grid resolution is coarser in the open regions with increasing resolution toward the shore. Grid parameters and range of scale of element sizes contained in the grid are given in Table 4. The two islands of Western Samoa, Savaii and Upolu, are included in the grid. The grid around the islands of Western Samoa was not specified to be as detailed as the region surrounding the islands of American Samoa. Reefs, shallow areas, and embayments are finely resolved so that the hydrodynamics can be accurately calculated in these regions. Details of the grid for Tutuila and

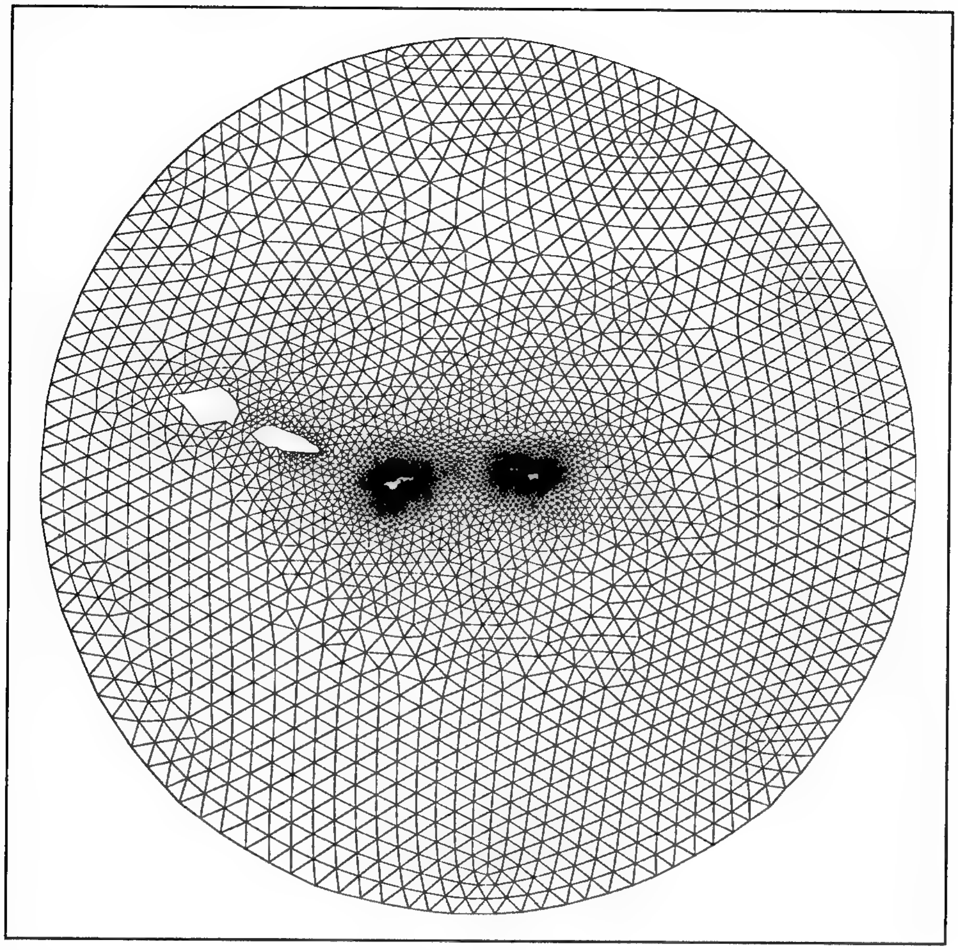

Figure 6. Computational grid for American Samoa

Table 4 **Storm Surge Grid Parameters**	
Parameter	**Value**
Maximum element area	81,628,823,171 ft^2 (7,583,565,680 m^2)
Minimum element area	14973 ft^2 (1391 m^2)
Ratio of maximum to minimum element areas	5,451,880
Number of elements	41,667
Number of nodes	22,072
Center longitude and latitude	170 W, 14.25 S
Circular grid radius	4 deg

Aunuu Islands are shown in Figure 7, and Figure 8 shows detail of Pago Pago Harbor. Detail of the grid for Ofu, Olosega, and Tau Islands are shown in Figure 9. Because of the fine grid resolution in reef areas coupled with the extreme hydrodynamic conditions (strong currents and rapid change in water level) associated with the storms, a time step of 5 sec was required for model runs.

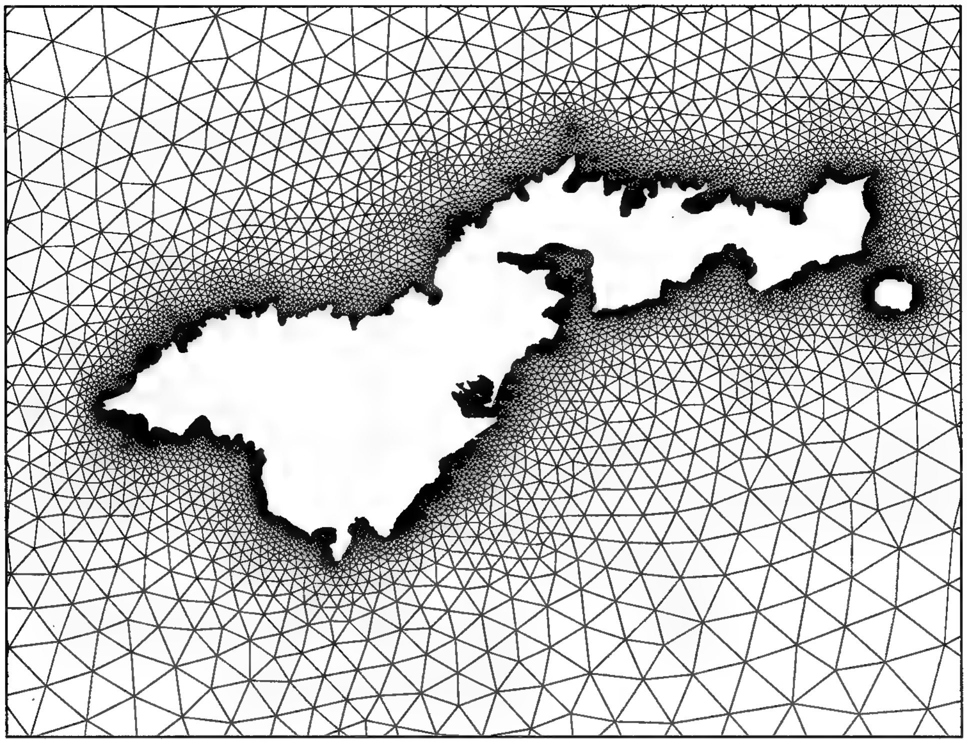

Figure 7. Computational grid showing detail for Tutuila and Aunuu Islands

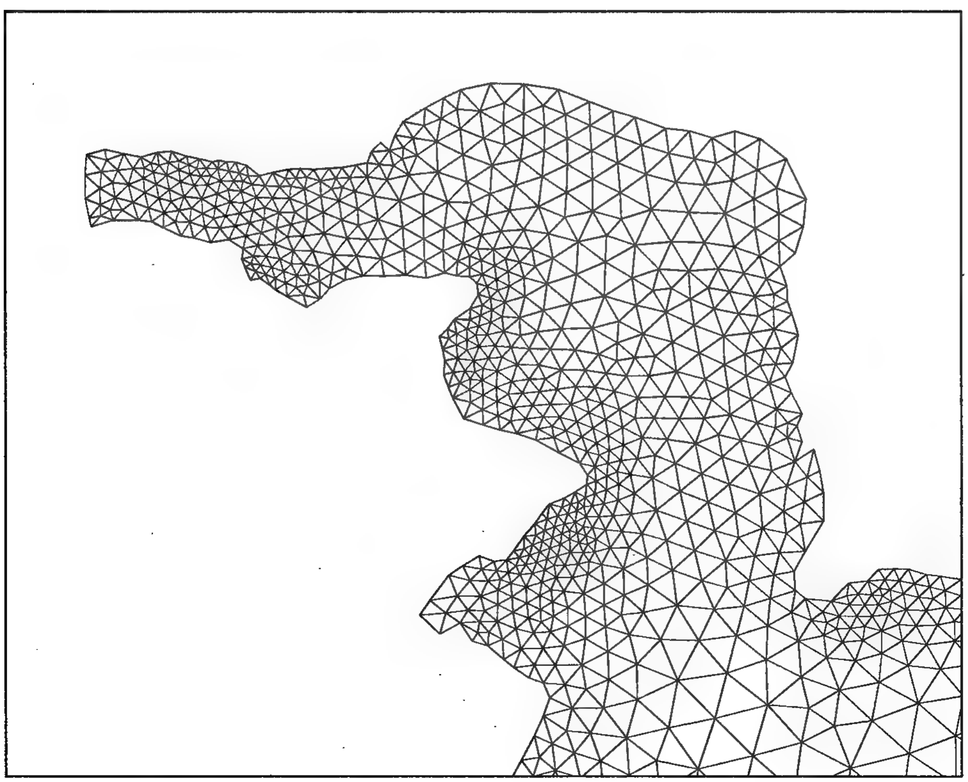

Figure 8. Computational grid showing detail for Pago Pago Harbor

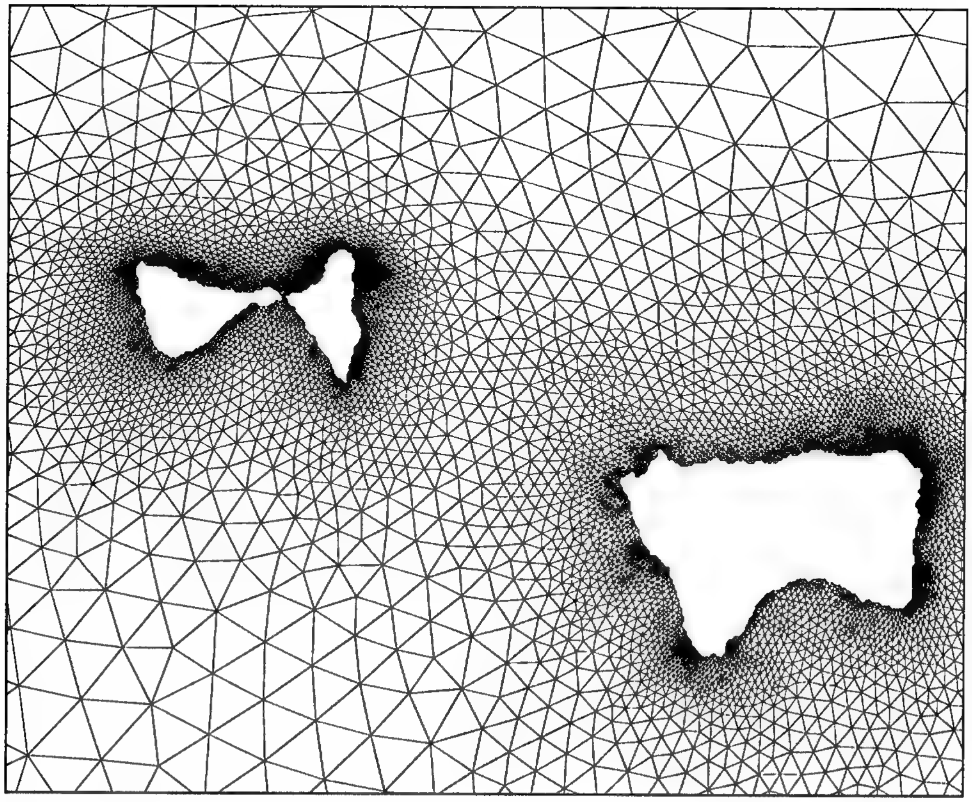

Figure 9. Computational grid showing detail for Ofu, Olosega, and Tau Islands

Several data sources were accessed for development of the computational grid. Initially, shoreline data were obtained from the World Vector Shoreline database and applied as the coastal boundary for the grid. Later, it was determined that the shoreline positions were displaced from the positions given in NOAA Chart #83484 (Samoa Islands). The island boundaries were transposed and corrected according to the shoreline digitized from NOAA Chart #83484. Deep-water bottom topography data were obtained from the National Center for Atmospheric Research ETOPO5 database. Depths for shallow regions surrounding the islands of interest for the study were digitized from NOAA Chart #83484, where data were available. Grid depths are referenced to Mean Sea Level (MSL).

Tidal elevations specified at the open water boundary were calculated from tidal amplitudes and phases contained in the LeProvost World Tidal Constituent Database, which provides constituent data at 1-deg increments in latitude and longitude. A bilinear interpolation algorithm was applied to calculate tidal amplitudes and phases at 118 open boundary nodes. The four tidal constituents applied at the open boundaries were: M_2, S_2, N_2, and O_1.

4 Implementation of Storm Surge Model

The process required for application of a long-wave hydrodynamic numerical model at a particular site includes grid generation, model calibration, model validation, and production runs. Accuracy of model results is greatly influenced by the accuracy of boundary and forcing conditions, representation of the geometry of the study area (i.e. bottom topography and land/water interface), and to a lesser degree, the values of certain "calibration" parameters. Model calibration involves adjustment of the calibration parameters, such as the bottom friction coefficient, to maximize agreement between model results and measurements.

Upon completion of calibration, the model is subject to a validation that consists of applying the model over a different segment of time from that of the calibration and where no changes have been made to the calibration parameters. The model is validated if results agree with measurements within an acceptable degree of error. The validation procedure provides confidence that the model can accurately simulate the hydrodynamic processes in the study area.

The strategy for calibrating and validating the storm surge model requires that the model accurately simulate both tidal propagation and storm surge in the study area. The model was first tested for simulation of tidal motion, then tested with the hurricane wind and pressure fields. Procedures applied in conducting model testing and the results of these tests are presented in the following sections.

Calibration of Storm Surge Model

The model was calibrated for tidal propagation and subsequently verified for both tides and storms. Water-level measurements were available from one gauge within the study area located in the upper reach of Pago Pago Harbor, Tutuila Island. The position of the gauge is 14.2783 S, 170.6817 W. Because measurements were only available at one location, the model could not be tested for accuracy at other locations in the study area. However, because the inner regions of bays and harbors are relatively difficult to calibrate, in comparison to deeper coastal and open ocean regions, it is expected that water-level calculations in other regions of the model domain are accurate if calculated water level in the harbor is accurate. Stations where accuracy may be compromised are located in

Pala Lagoon, Tutuila Island (see Table A1 for positions of stations TU49 and TU50). Bathymetric data were not available for this shallow lagoon or Avatele Passage, the entrance to the lagoon. The exchange between Pala Lagoon and the ocean may be severely restricted because of the shallow depth of Avatele Passage, which is a shallow reef area according to NOAA Chart #83484.

Calibration of the storm-surge model was conducted by driving the model with four tidal constituents and comparing the results of a harmonic analysis of the water level at the Pago Pago Harbor gauge to that calculated by NOS. Table 5 gives the tidal constituents at Pago Pago Harbor as determined by NOS and calculated by ADCIRC. Originally, the K_1 and K_2 tidal constituents were included in the calibration but were subsequently removed because their amplitude and phase calculated by the model were incorrect. It is thought that the source of error for these two constituents was an error in the tidal boundary condition specified by the tidal-constituent database. Error in tidal propagation would have been present in other constituents, which did not occur. The simulated water level constituents at the gauge location compare favorably to those calculated from measurements. The maximum error in amplitude is 0.38 in (0.96 cm) for the M_2 and N_2 constituents and the maximum error in phase is 7.4 deg for the S_2 constituent.

Table 5
Tidal Constituents in Pago Pago Harbor

Constituent	NOS Amplitude in (cm)	NOS Phase Deg	ADCIRC Amplitude in (cm)	ADCIRC Phase deg	Amplitude Error[1] in (cm)	Phase Error[2] Deg
M_2	14.80 (37.58)	180.0	14.42 (36.62)	178.1	-0.38 (-0.96)	-1.9
S_2	2.43 (6.17)	165.5	2.10 (5.33)	158.1	-0.33 (-0.84)	-7.4
N_2	4.22 (10.73)	161.6	3.85 (9.77)	162.4	-0.38 (-0.96)	0.8
O_1	1.14 (2.90)	68.3	1.08 (2.73)	65.6	-0.07 (-0.17)	-2.7

[1] Amplitude Error = Modeled Amplitude – NOS Calculated Amplitude.
[2] Phase Error = Modeled Phase – NOS Calculated Phase.

Water level calculated by the model for the period Jan. 4, 1996 through Jan. 29, 1996 was compared to water level calculated from tidal constituents (Figure 10) for the Pago Pago Harbor gauge location. Twenty-three constituents were included in the calculation of water level from tidal constituents. Figure 10 shows generally good agreement between the model results and tidal-constituent calculated water level. Error in the modeled water level is probably due mostly to the K_1 component missing from the model tidal forcing. The comparisons for Jan. 1996 validate the model for tidal conditions.

Validation of Storm Surge Model

The storm surge model was validated by comparison of measured and calculated time-series water levels at the Pago Pago Harbor gauge for the period when Hurricane Val passed through the study area. Comparison of measured and calculated water level during the passage Hurricane Val is shown in Figure 11.

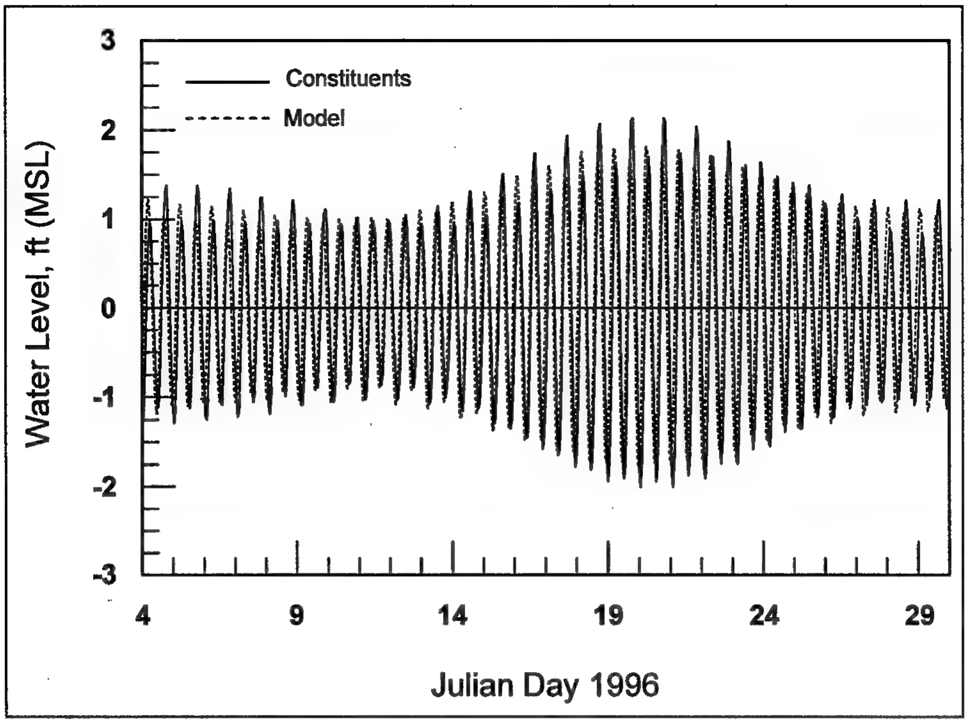

Figure 10. Tidal constituent calculated and modeled water level at Pago Pago Harbor gauge for Jan. 4, 1996 through Jan. 29, 1996

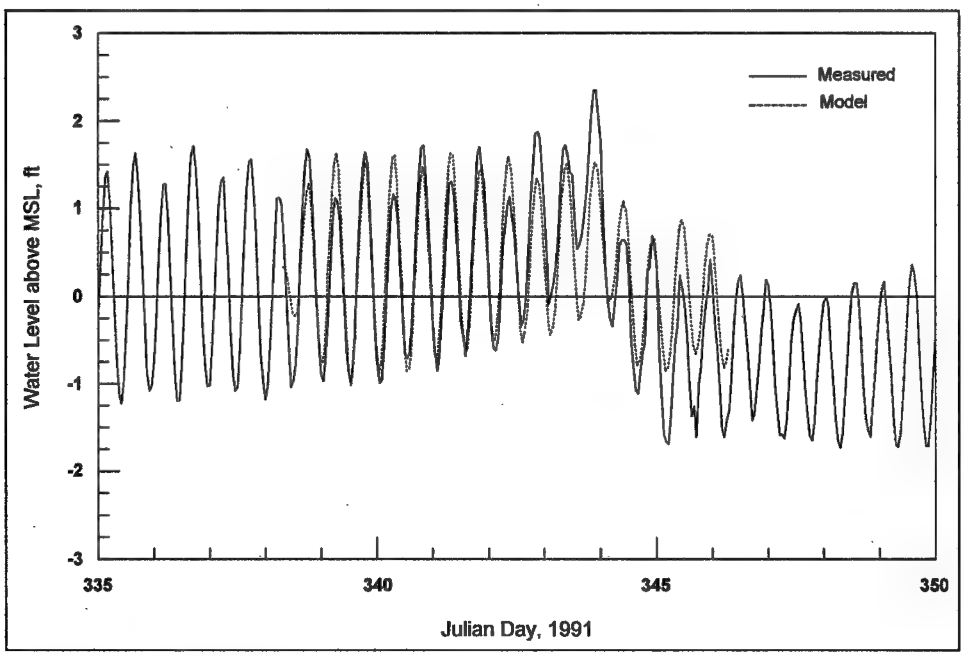

Figure 11. Measured and modeled water level in Pago Pago Harbor for Hurricane Val

5 Development of Stage-Frequency Relationships

Stage-frequency relationships were developed for the Territory of American Samoa in four tasks. First, the training set of storms was developed from a storm database for the southern Pacific Ocean, and the PBL model was applied to calculate the wind fields associated with each storm in the training set. Second, the storm-surge model was applied with wind and atmospheric pressure forcing from the PBL model as time-dependent input. Time-series of storm-surge elevations associated with each storm were calculated for specified stations. Third, time series of wave parameters were calculated by application of the wave and wave-transformation models. Time series of ponding level, setup, and runup were calculated for each profile location in the study site. Fourth, the EST was applied to compute stage-frequency relationships based on the hurricane event parameters and calculated storm surge elevations.

Selection of Hurricanes

The HURDAT database for the south Pacific Ocean contains hurricane and tropical storm information covering a large area including Australia and New Zealand. A subset of storms was selected from the database to comprise the training set for American Samoa. An initial criterion for inclusion in the training set was that the storm track had to pass within a 200 mi radius of any station given in a station list. The station list consisted of 88 stations near the island coasts. Of the 622 storms contained in the HURDAT database for the south Pacific Ocean for 1958 through 1995, 31 storms met the 200 mi radius criteria. These storms were further examined to determine whether they impacted the coasts of the study site. All storms in the training set were found to produce wave-induced setup and runup on the coast, so no storms were eliminated from the training set. The set of historical storms included in the training set is given in Table 6 and storm tracks are provided in Appendix E.

Storm Surge/Tidal Elevation Relationship

Storm-surge elevations are dependent on water depth as well as intensity and angle of approach of the storm. The most accurate method for calculation of

Table 6 **Historical Storms Included in Training Set**					
Hurricane		**Starting Time**		**Ending Time**	
Number	**Name**	**Date**	**Time, GMT**	**Date**	**Time, GMT**
18		02/10/59	0000	02/15/59	0000
20		02/13/59	0000	02/16/59	0000
21		02/23/59	0000	03/02/59	0000
28		01/16/60	0000	01/20/60	0000
33		03/17/60	0000	03/23/60	0000
49		03/12/61	0000	03/20/61	0000
60		02/17/62	0000	02/19/62	0000
64		12/21/62	0000	12/26/62	0000
82		03/07/63	1200	03/17/63	0000
96		01/20/64	0000	01/28/64	0000
97		01/24/64	0000	01/26/64	0000
127		01/24/66	0000	02/10/66	0000
146		12/14/67	0000	12/20/67	0000
179		02/11/70	1200	02/24/70	1200
231		01/29/73	0000	02/01/73	1200
274		01/24/75	0000	02/05/75	1200
335		02/13/78	1200	03/01/78	0000
352		02/20/79	0000	02/23/79	1200
390		02/20/81	0000	02/24/81	0000
393		03/01/81	0000	03/03/81	1200
414		02/28/82	0000	03/03/82	1200
500		01/15/87	0000	01/20/87	0600
504		02/03/87	0000	02/05/87	1200
510		02/27/87	0000	03/07/87	0000
513		04/19/87	1800	04/26/87	1200
525	Gina	01/06/89	0600	01/10/89	0000
543	Ofa	01/28/90	0000	02/09/90	1200
562	Val	12/04/91	0600	12/13/91	1200
575	Gene	03/13/92	1800	03/19/92	0000
586	Lin	01/29/93	0000	02/04/93	0000
588	Mick	02/03/93	0000	02/09/93	1200

surge is inclusion of tides in the storm-surge simulation. However, this approach is not practical for stage-frequency analysis because numerous tidal phases would have to be modeled for each storm in the training set to acquire a representative set of surge and tide combinations. An alternative approach was taken in this study to estimate the combined water-surface elevation of the surge and tide. Simulations were performed for each of the 31 storms in the training set, where the still-water level was taken to be MSL. Tides were not included in the

computations. Because storm surges are small for the study site, the water-surface elevation for the combined surge and tide can be approximated as a linear superposition of the two. Thus, still-water level for stage-frequency computations was calculated by addition of the surge to a specific tidal elevation.

A total of 88 numerical gauge stations was specified as locations for surge output from the storm-surge model. The stations for Tutuila and Aunuu are shown in Figures 12 and 13. The stations for the Manu'a Islands are shown in Figures 14 and 15. Appendix A gives the latitude and longitude of stations. Water-level values were stored at 15-min intervals at each station. Combined time-series water-level and wave information were applied for the ponding level, setup, and runup calculations.

Spectral Wave Transformation

Waves calculated by the WISWAVE model were transformed by application of the spectral spreading model WAVTRAN, described in Chapter 3. Estimates were made of the general shoreline orientation closest to each of the numerical gauge locations specified in Appendix A. In addition, estimates of sheltering angle bands were made based on shoreline geometry (bays, coves), existence of land points, and islands. For waves calculated for many of the numerical gauge locations, two-sided sheltering was applied.

For numerical gauge locations TU39 through TU45, within Pago Pago Harbor, standard WAVTRAN modeling was insufficient to capture the more complex propagation and sheltering occurring in this extensive, protected area. A different approach was used to determine wave transformation in Pago Pago Harbor. The approach took advantage of a recent study which included more comprehensive wave modeling in Pago Pago Harbor with the finite element model CGWAVE (Thompson and Demirbilek 2002). Offshore waves from a deepwater WISWAVE station outside the entrance to Pago Pago Harbor and near the seaward CGWAVE boundary were transformed to 14 stations placed at representative points in the harbor (Figure 16). Stations in Pago Pago Harbor were placed on the 33-ft (10-m) depth contour, a representative depth for waves incident to the fringing reef fronting most of the shoreline. Transformation calculations were performed with a directional spectrum of energy, but wave breaking and other nonlinear energy dissipation processes were not included. Details of the CGWAVE model study and transformation calculation procedure are described by Thompson and Demirbilek (2002).

Wave Ponding on Reefs

Wave-forced impoundment of water over reefs, often called wave ponding, is caused by overtopping and breaking of waves onto the reef platform. As waves overtop and break on the reef, water is collected over the reef causing an elevated water level across the full width of the reef (Figure 17). Seelig (1983) conducted a set of laboratory flume experiments for fringing reef profiles typical of Guam to investigate hydraulics of reef-lagoon systems. Because the reef systems of

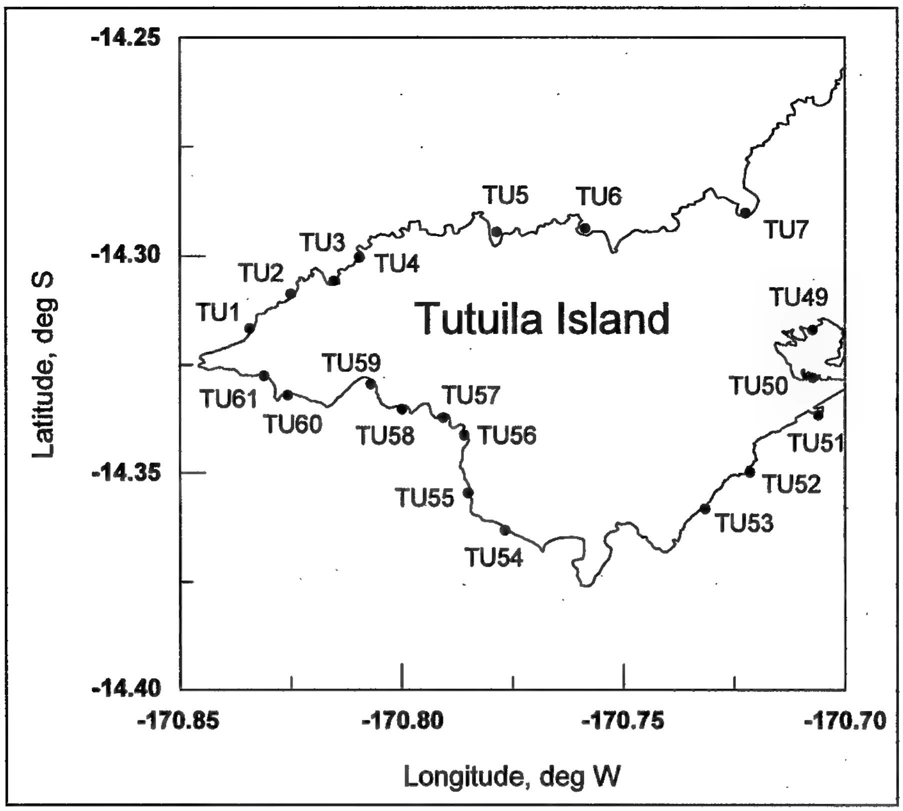

Figure 12. Station locations for western Tutuila Island

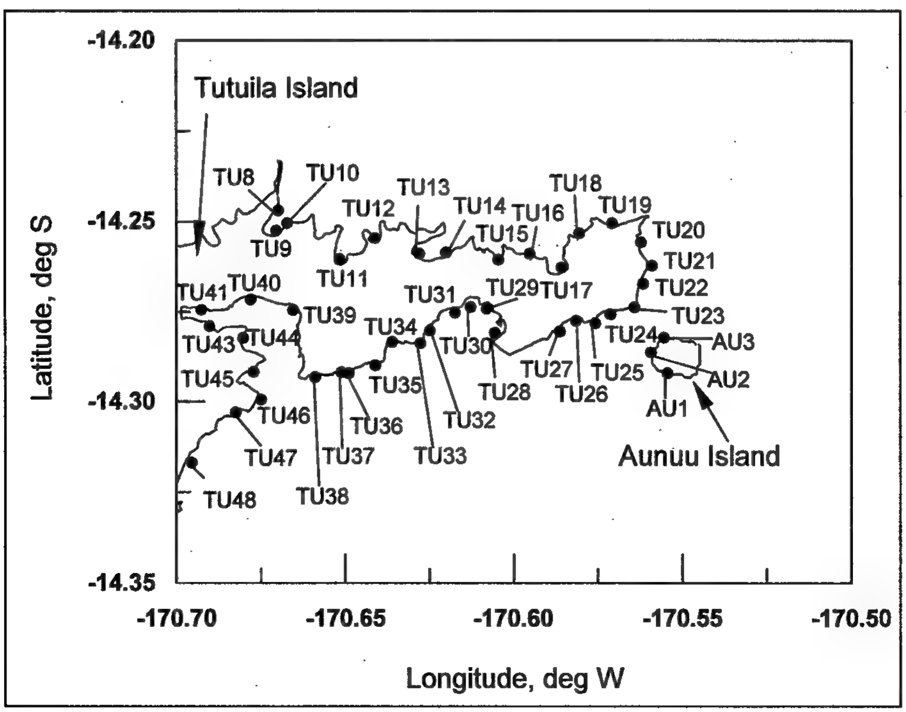

Figure 13. Station locations for eastern Tutuila Island and Aunuu Island

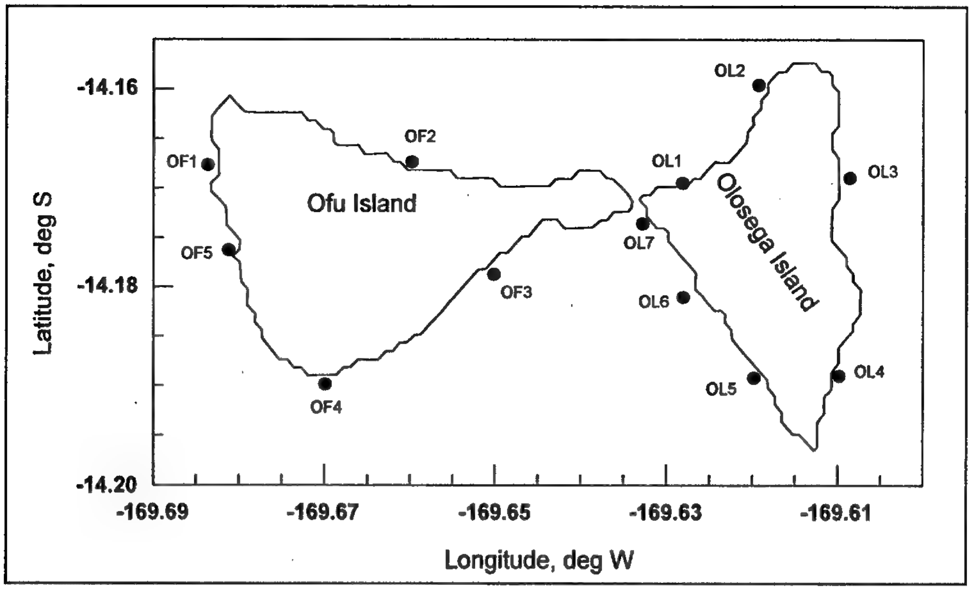

Figure 14. Station locations for Ofu Island and Olosega Island

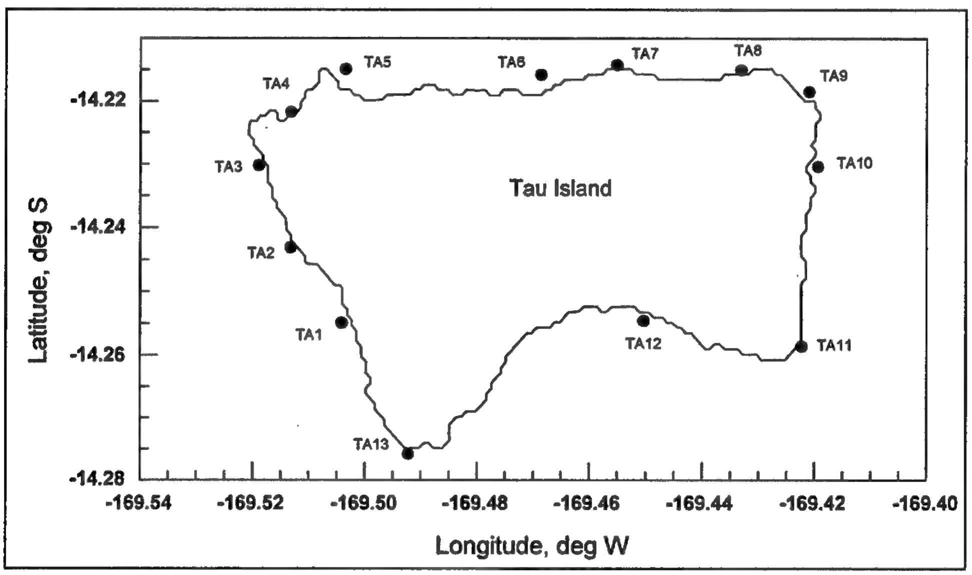

Figure 15. Station locations for Tau Island

Guam are similar to those of the Territory of American Samoa, Seelig's formulations were applied in this study. Wave ponding level resulting from wave overtopping and breaking was examined. Parameter ranges were varied as follows: still-water depth at the reef crest was specified to be 0 ft (0 m) and 6.6 ft (2 m), wave periods ranged from 8 to 16 sec, and irregular deep-water significant wave height ranged from 8.2 to 35.1 ft (2.5 to 10.7 m).

Seelig found that ponding water level is a function of still-water level (astronomical tide and storm surge), deep-water significant wave height, and wave period. Gourlay (1996) confirmed these findings. Ponding level varies with time, increasing when a group of several unusually high waves impacts the

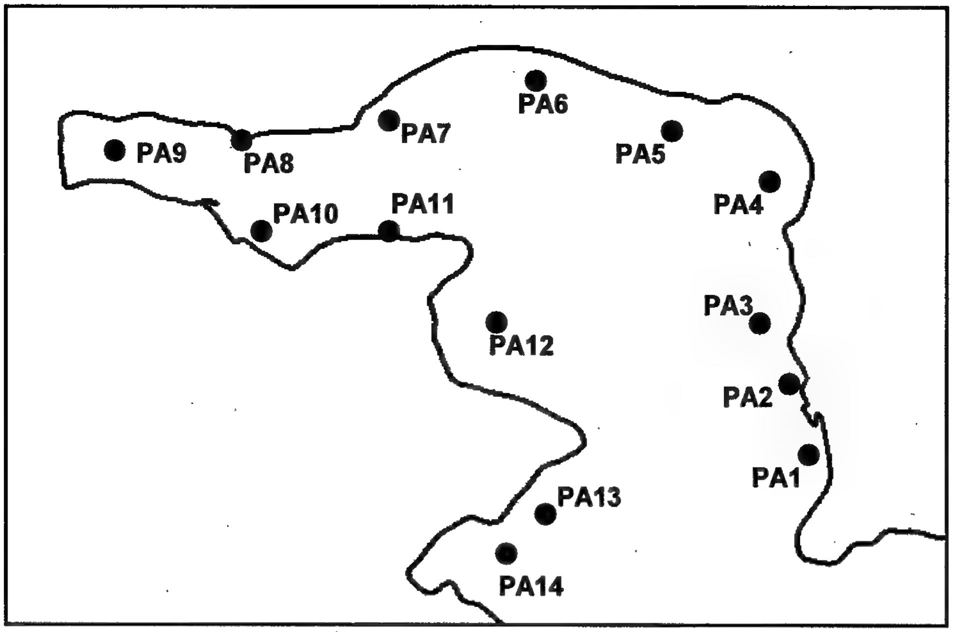

Figure 16. Station locations for Pago Pago Harbor

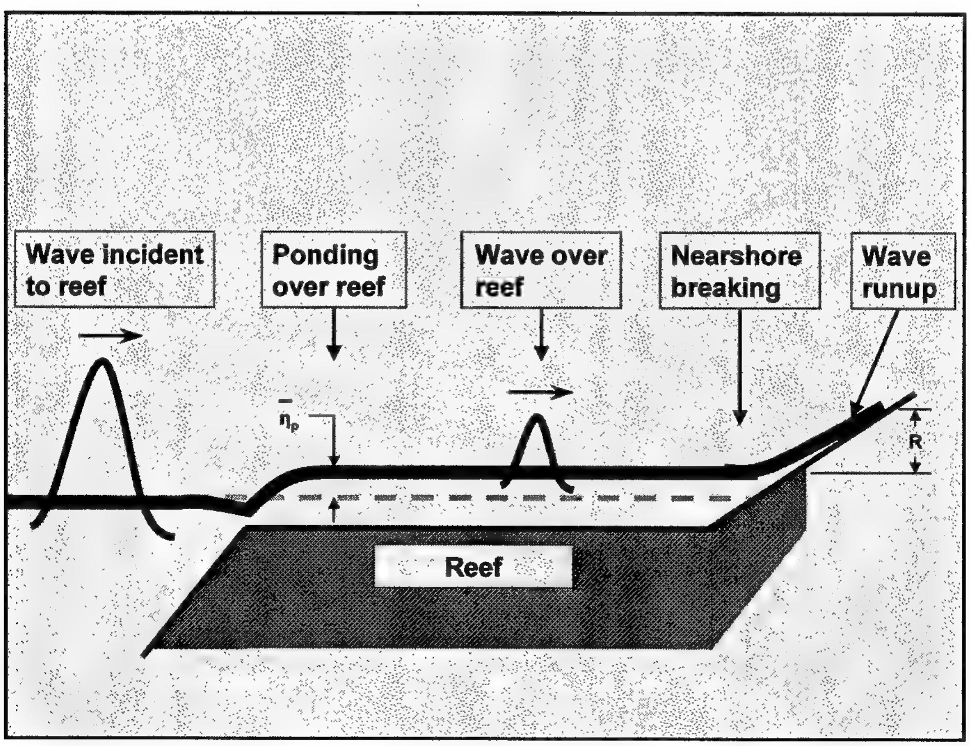

Figure 17. Definition sketch of wave ponding and runup

reef and decreasing during sequences of lower waves. Mean ponding level can be estimated by (Seelig 1983)

$$\overline{\eta}_p = a_1 + a_2 \log\left(H_0^2 T_p\right) \tag{17}$$

where $\overline{\eta}_p$ is the mean ponding level, H_0 is the deep-water significant wave height incident to the reef face, T_p is the peak wave period, and a_1 and a_2 are empirical coefficients dependent on the still-water level. Table 7 gives values of the empirical coefficients for irregular waves when H_0 and $\overline{\eta}_p$ are expressed in meters. Based on calibration tests with Hurricane Ofa discussed later in the chapter, average height of the one percent highest waves was used in place of significant height for waves incident to the reef face in this study.

Table 7
Ponding Level Coefficients for Irregular Waves (Seelig 1983)

Depth, ft (m)	a_1	a_2
0 (0)	-0.92	0.77
6.6 (2)	-1.25	0.73

Note: Depth measured relative to reef crest

Wave Setup and Runup

Ponding is considered as an increase in water level over the full width of the reef, extending from the reef crest to shore. An additional, localized, increase in water level at the shore is caused by final breaking of waves re-formed within the lagoon system after initial breaking on the reef. The localized increase at shore includes wave setup due to wave breaking on the nearshore slope and wave runup, *R*, on land (Figure 17). Wave setup is affected by local bathymetry; runup is highly influenced by local bathymetry and topography.

To calculate wave ponding, setup, and runup and estimate coastal inundation levels, a series of transects was established along the inhabited coasts of American Samoa. A total of 374 transects fell within the study area. Transect profiles were specified by topographic elevation contours surveyed for this study and provided by CEPOH. Elevations were specified relative to MSL. The number of transects for each of the five islands comprising the study area is given in Table 8. In addition to the measured profile data, reef width normal to the beach was estimated from the topographic maps. The profiles were extended seaward by the estimated reef width. Depths on the reefs were assumed to vary from 1 to 3 ft (0.3 to 0.9 m) MSL. Transect profile names and corresponding numerical gauge station names from Appendix A are given in Appendix B.

Table 8 Number of Transects for American Samoa Islands	
Island	**Number of Transects**
Tutuila	336
Aunuu	5
Ofu	6
Olosega	10
Tau	17

Four profiles along the exposed runway of Pago Pago International Airport received special consideration because they can be overtopped during severe storms. At the request of CEPOH, the subaerial portion of these profiles was treated as a uniform slope extending to an elevation beyond possible runup levels. The profiles are 276a, 277, 278 and 279 and corresponding slopes (provided by CEPOH) are 28, 14, 33 and 74 percent, respectively. Stage-frequency information on these artificial slopes is to be applied by CEPOH in a low bluff methodology to estimate inundation impacts further shoreward.

This approach for estimating coastal inundation levels has been used in previous studies at other locations. However, the approach has some major limitations relative to American Samoa. First, the coast of American Samoa varies greatly over short distances in shape and topographic relief. Steep cliffs and headlands are interspersed with flat coastal plains and embayments. Thus, nearshore wave processes, particularly wave runup at the shore, is strongly affected at many locations by the three-dimensionality of land forms. The modeling approach does not capture this three-dimensionality. Second, extreme coastal inundation events along most coasts of American Samoa are primarily due to huge waves attacking the shore. Storm surge is only a small component of extreme events. In contrast, storm surge is the major component of coastal inundation along U.S. Atlantic and Gulf of Mexico coasts. Thus, in an exposed island environment such as American Samoa, accuracy of coastal inundation calculations is much more dependent on accurate modeling of waves, which naturally vary greatly over short distances, much more so than storm surge.

More comprehensive modeling tools which would be expected to provide more realistic coastal inundation estimates for American Samoa are under development, but were not available at the time of this study. Therefore, the traditional approach was used. Methods for calculating wave setup and runup on the two-dimensional coastal profiles are described in the following paragraphs.

Wave setup results when the pressure gradient of the sloping water surface (i.e., mean still-water depth) is in equilibrium with the cross-shore directed radiation stress, which represents the gradient of momentum of incoming waves in the shoreward direction:

$$\frac{d\eta}{dx} = -\frac{1}{\rho g d}\frac{dS_{xx}}{dx} \qquad (18)$$

where $\overline{\eta}$ is the mean still-water level, ρ is the water density, g is the acceleration due to gravity, S_{xx} is the cross-shore component of the cross-shore directed radiation stress, d is depth, and x is the cross-shore distance. Under the assumption of linear wave theory, wave setup in the surf zone is

$$\frac{d\overline{\eta}}{dx} = -\frac{3}{16}\frac{1}{d+\overline{\eta}}\frac{d\left(H^2\right)}{dx} \tag{19}$$

where H is the wave height.

Wave setup was estimated at coastal profiles based on wave height decay with distance over the nearshore slope, similar to Equation 19 but adapted to irregular waves (Coastal Engineering Manual 2002). Since wave setup is considered to be a constant increase in local water level (for given tide, surge, and incident wave conditions), estimates of wave setup, apart from wave runup, are needed to calculate maximum still water levels.

Wave runup is the maximum water-surface elevation caused by the uprush of water at shore from a breaking wave. The computational method presented in the *Shore Protection Manual* (1984) was applied for the runup calculations for this study. This method includes the effect of wave setup in the runup estimates. The composite slope method, developed by Saville (1958), was applied to account for changes in grade along a given profile. Calculated runup was multiplied by a factor of 0.9 to account for effects of roughness and porosity.

Incident wave height for setup and runup calculations was determined from wave conditions incident to the seaward edge of the reef, water depth over the reef, and reef width. For a very wide reef, incident wave height for setup and runup calculations was assumed to be equal to the maximum breaking wave height that can be sustained over the reef estimated by

$$H_b = \gamma_b d_b \tag{20}$$

where H_b is the height of the breaking wave, d_b is water depth over the reef, and γ_b is the breaking depth index. The breaking depth index can range from 1.1 to 0.4 across reefs (Gerritsen 1980, Hardy et al. 1990). A typical breaking depth index for monochromatic waves on beaches has a value of 0.78, but this value is overly conservative for calculation of design wave heights landward of the reef edge (Smith 1993).

For high offshore wave conditions and narrow reefs, incident wave height for setup and runup calculations can be expected to be higher than the limit given by Equation 20. Reef width was included in the modeling approach for this study as a result of calibration efforts discussed in the following section. The approach was based on results from Hardy et al. (1990) and Smith (1993). The wave approaching the seaward reef face (taken as the average height of the one percent

highest waves incident to the reef face, based on calibration tests discussed in the following section) was assumed to decay in height with propagation distance over the reef. The stable decayed wave height reached over a wide reef is given by Equation 20 with γ_b equal to 0.4 and with ponding included in d_b. When wave height incident to the reef exceeds the stable decayed wave height, the decay with propagation distance over the reef is given by

$$\frac{d(H^2)}{dx} = \frac{-\kappa}{d_b}\left(H^2 - \gamma_b^{\,2} d_b^{\,2}\right) \tag{21}$$

where κ is a decay constant. A value of κ equal to 0.02 was used, based on calibration tests and on field data from Hardy et al. (1990).

Hurricane Ofa – Water Level Comparison

Maximum water elevation calculations, which include wave runup, were compared to debris-line water elevations surveyed by FEMA for Hurricane Ofa. The observed values were supplied for villages on Tutuila Island. Hurricane Ofa was a powerful storm in February 1990 that passed about 150 miles (250 km) west of Tutuila, creating waves with significant height of 13-15 ft (4.0-4.5 m) and peak period of 12-13 sec at the Tutuila coast. Hurricane Ofa caused flooding along Tutuila coasts, and FEMA documented maximum levels at many villages. Hurricane Ofa was one of the more damaging storms in the training set of historical storms. Hurricane Val, the most damaging storm modeled, occurred the following year (December 1991), but no observations of inundation level were available. Therefore, Hurricane Ofa observations were used to calibrate the model procedure.

Water levels were computed by linear supposition of tide, surge, ponding level, and wave runup (which includes wave setup). These parameters were calculated as previously described. Time series of water levels were computed at villages during the passage of Hurricane Ofa and the maximum values of water level, referenced to MSL, were extracted from the time series. Since the precise location of observed levels was not available and the observations were considered maximum levels for each village, the profile which produced the highest water level within the village area was used for comparison (Table 9). Also, since the profiles do not represent the full range of possible runup paths, a representative steep slope in the village area was included in the calculations. Water level along the steep slope is generally higher than along any of the actual profiles (Table 9). Observed water elevations fell between or within 1 ft (0.3 m) of the two calculated water elevations at 11 villages. At the other villages, observed levels were higher than calculated levels at four villages and lower at four villages.

Table 9 Observed and Calculated Water Level for Hurricane Ofa			
Village	Observed Water Level (FEMA), ft msl	Maximum Calculated Water Level, Actual Profile, ft msl	Maximum Calculated Water Level, Steep Slope, ft msl
Poloa	15	15.6	16.5
Fagalii	22	14.1	19.7
Maloata	21	14.2	18.8
Fagamalo	21	17.3	17.1
Fagasa	8	13.8	13.6
Vatia	7.5	6.4	15.4
Afono	8.5	11.6	15.3
Masefau	5	9.6	12.8
Masausi	16	8.4	16.9
Sailele	16	12.3	16.4
Aoa	12.5	12.9	13.7
Onenoa	22	18.1	22.9
Lauagae	22	13.8	17.7
Alao	11	10.9	6.3
Amouli	12	12.9	12.2
Afao	17	19.3	20.5
Seetaga	11	9.9	13.4
Utumea	12.5	11.2	13.4
Amanave	13	12.4	20.5

These results represent the final calibration after many different variations in the nearshore model for calculating ponding, setup, and runup. An objective of the study was to configure the model to reasonably represent nearshore processes and match the observations, within the limits of the methodology being used. Significant changes introduced during the calibration tests include consideration of reef width, setting γ_b to 0.78, and use of the average height of the one-percent highest waves, H_1, as the incident wave height on the seaward edge of the reef. Recognizing that ponding and runup levels vary over short time intervals as groups of higher waves impact the coast, a water level based on significant wave height (which represents the average height of the one-third highest waves) would not be expected to capture the maximum runup level observed at shore. Details of ponding and runup variability over short time intervals cannot be modeled, but a more representative extreme can be modeled by increasing wave height incident to the reef and γ_b. Model estimates of ponding and runup at the shore would increase correspondingly. Since H_1 produced a reasonable calibration to the Hurricane Ofa observations, it was incorporated into the modeling approach. The H_1 is calculated as 1.67 times the significant height incident to the reef. This factor is based on the Rayleigh Distribution, a well-established and widely accepted distribution of wave heights in a sea state prior to wave breaking.

Stage-Frequency Relationships

Stage-frequency relationships were calculated for 374 profiles along the coast of the American Samoa Islands by application of the EST. These relationships were computed for maximum water level at intervals of 2, 5, 10, 25, 50, 75, and 100 years. Input for the EST included the maximum water level calculated for each of the 31 storms in the training set. The EST was applied to two maximum water level calculations. In one, maximum water level was the total of storm surge, ponding level, and runup. The other calculation was based on maximum still water level, the total of storm surge, ponding, and wave setup. Both provide useful information about coastal inundation levels: maximum water level is the highest level reached by ocean water, reached briefly by the highest runup; maximum still water level is the highest sustained water level (an average water level over many runup/rundown cycles). Tables of stage-frequency relationship values for each profile are given in Appendix C. Maximum expected water-level values and standard deviations are given in the tables.

Because the American Samoa Islands are located in a region of tropical storm and hurricane formation and propagation, the Islands can experience storms or waves from any direction. All coastlines of the Islands are subject to storm waves and may experience significant inundation, with the exception of the protected areas Pago Pago Harbor and Pala Lagoon. The arcuate shape of many of the coves, particularly on Tutuila, provides sheltering from waves in specific angle bands.

In addition to the stage-frequency relationships, values of wave parameters and water level components for each storm at selected profiles are presented in Appendix D. The values correspond to the time during the storm passage at which total water level, including runup, reached its maximum at the profile. These tables provide a perspective on the stage-frequency relationships in Appendix C. For example, the strong impact of Hurricane Val (562) is evident at many profiles.

6 Summary and Conclusions

A set of hurricane-induced stage-frequency relationships was developed for the Territory of American Samoa. The subject study area consists of the five volcanic islands Tutuila, Aunuu, Ofu, Olosega, and Tau. Calculation of surge, wind and pressure field, and wave characteristics were performed for 31 historical storms through application of four numerical models. Wave-induced ponding, setup, and runup were calculated at profile locations specified by the Honolulu District.

The circulation model ADCIRC was applied for calculation of storm surge in the study area. Model calculations compared well to NOAA tidal constituents calculated for Pago Pago Harbor. For storm surge calculation, ADCIRC applied wind and pressure fields calculated by the Planetary Boundary Layer (PBL) model as the atmospheric forcing.

The PBL model was applied for simulation of storms whose paths brought the storm centers within a 200-mi (370-km) radius of the five islands constituting the study site. Historical data from the storms were input into the PBL model for calculation of wind and pressure fields. The atmospheric fields calculated by the PBL model were applied as forcing for the circulation and wave models.

Deep-water wave heights, periods, and directions for each storm were calculated by application of the wave model WISWAVE. These deep-water waves were transformed by application of the wave-transformation model WAVTRAN. For wave propagation into Pago Pago Harbor, results from a recent CGWAVE model study were used to transform waves to specific points within the harbor.

Storm surge (wind- and atmospheric pressure-induced) was simulated for 31 historical storms and referenced to Mean Sea Level. Because the islands of American Samoa are volcanic cones with steep sides, shallow shelf areas (such as on the east coast of the United States) do not exist around the islands, so the storm surge does not shoal. Consequently, storm surge (without consideration of waves) is a small contribution to coastal inundation during severe storms. Wave ponding on the reefs, wave setup, and runup cause high inundation levels during storm events.

The EST was applied to calculate stage-frequency relationships based on historical storm parameters and calculated response to the storms. These relationships were calculated from the maximum total water levels computed for

each storm (including storm surge, ponding, and runup) and from the maximum still water levels for each storm (including storm surge, ponding, and wave setup). Stage-frequency values and their standard deviations were calculated for 2, 5, 10, 25, 50, 75, and 100-year return periods at 374 profiles. The methodology was calibrated to observations from Hurricane Ofa so that stage-frequency values for maximum total water level are expected to represent maximum debris line inundation levels.

The present methodology, in which wave setup and runup at shore are calculated along shore-perpendicular profiles without consideration of actual variations in bathymetry and topography on either side of the profiles, is limited in its ability to accurately model coastal inundation levels on American Samoa. However, the methodology provides initial information about coastal inundation levels. When modeling tools better suited to nearshore processes along island coasts with fringing reefs become available, the possibility of updating this study should be considered.

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Appendix A
Station Locations

Table A1 **Station Locations for Stage-Frequency Relationships**			
Station	**Nearest Village or Landmark**	**Latitude, deg S**	**Longitude, deg W**
	Tutuila Island		
TU1	Poloa	14.3166	170.8344
TU2	Fagalii	14.3087	170.8251
TU3	Maloata	14.3057	170.8154
TU4	Fagamalo	14.3002	170.8096
TU5	Aoloautua	14.2945	170.7786
TU6	Aasu	14.2937	170.7586
TU7	Fagalea, Fagasa, Fagatele	14.2901	170.7224
TU8	N. Vatia Bay	14.2468	170.6699
TU9	Vatia	14.2524	170.6705
TU10	E. Vatia Bay	14.2503	170.6672
TU11	Afono	14.2602	170.6516
TU12	Oa	14.2544	170.6412
TU13	Masefau	14.2587	170.6280
TU14	SE Masefau Bay	14.2585	170.6202
TU15	Masausi	14.2604	170.6045
TU16	Sailele	14.2587	170.5954
TU17	Aoa	14.2625	170.5858
TU18	Onenoa	14.2531	170.5806
TU19	Maupua	14.2503	170.5708
TU20	Tula	14.2556	170.5623
TU21	Maliuga Pt	14.2620	170.5591
TU22	Alao	14.2671	170.5617
TU23	Matuli Pt	14.2737	170.5644
TU24	Utumea	14.2757	170.5714
TU25	Aganoa	14.2780	170.5759
TU26	Amouli	14.2774	170.5816
TU27	Fugaau	14.2804	170.5864
			(Sheet 1 of 3)

Table A1 (Continued)

Station	Nearest Village or Landmark	Latitude, deg S	Longitude, deg W
Tutuila Island (Cont.)			
TU28	Alofau	14.2808	170.6056
TU29	Pagai	14.2741	170.6081
TU30	Fagaitua	14.2736	170.6128
TU31	Utusia, Amaua	14.2751	170.6175
TU32	Auto	14.2801	170.6250
TU33	Avaio	14.2836	170.6278
TU34	Alega	14.2833	170.6361
TU35	Siliataligau Pt	14.2898	170.6411
TU36	Aumi	14.2920	170.6490
TU37	Lauliituai	14.2918	170.6512
TU38	Lauliifou	14.2931	170.6590
TU39	Aua	14.2744	170.6655
TU40	Leloaloa	14.2715	170.6781
TU41	Lalopua, Satala	14.2744	170.6926
TU43	Malalua, Fagatogo	14.2789	170.6902
TU44	Utulei	14.2822	170.6803
TU45	Fagaalu	14.2917	170.6773
TU46	Fatumafuti	14.2994	170.6749
TU47	Matuu	14.3030	170.6825
TU48	Coconut Pt	14.3169	170.6955
TU49	Tualiliu Pt (Pala Lagoon)	14.3170	170.7074
TU50	Avatele Passage (Pala Lagoon)	14.3279	170.7072
TU51	Matautuotafuna Pt	14.3366	170.7060
TU52	Alatele Cove	14.3498	170.7215
TU53	Vaitogi	14.3582	170.7316
TU54	Avaloa Pt	14.3632	170.7767
TU55	Vailoata	14.3546	170.7851
TU56	Leone	14.3413	170.7859
TU57	Amaluia	14.3372	170.7907
TU58	Afao	14.3352	170.7999
TU59	Nua	14.3294	170.8070
TU60	Failolo	14.3320	170.8258
TU61	Amanave	14.3276	170.8312
Aunuu Island			
AU1	Fogatia Hill	14.2920	170.5545
AU2	Aunuu	14.2862	170.5595
AU3	Alofisua Pt	14.2821	170.5556
			(Sheet 2 of 3)

Table A1 (Concluded)			
Station	Nearest Village or Landmark	Latitude, deg S	Longitude, deg W
Ofu Island			
OF1	Alaufau	14.1677	169.6837
OF2	Tuafanua	14.1674	169.6598
OF3	Toaga	14.1787	169.6502
OF4	Papaloloa Pt	14.1899	169.6699
OF5	Nuupule Rock	14.1763	169.6812
Olosega Island			
OL1	Lalomoana	14.1695	169.6282
OL2	Faiava	14.1596	169.6193
OL3	Imoa Pt	14.1689	169.6086
OL4	Oge	14.1890	169.6099
OL5	Pouono Pt	14.1892	169.6198
OL6	Olosega	14.1811	169.6281
OL7	Asaga Straight	14.1736	169.6328
Tau Island			
TA1	Afuli Cove	14.2549	169.5041
TA2	Fusi	14.2431	169.5132
TA3	Tau, Luma	14.2302	169.5189
TA4	Faleasao	14.2217	169.5132
TA5	Siulagi Pt	14.2149	169.5035
TA6	Avatele Cove	14.2158	169.4686
TA7	Faga	14.2142	169.4552
TA8	Lepula, Maia	14.2150	169.4332
TA9	Fitiuta	14.2185	169.4210
TA10	Papasao Pt	14.2304	169.4195
TA11	Tufu Pt	14.2586	169.4223
TA12	Laufuti Stream	14.2545	169.4504
TA13	Alaufau	14.2758	169.4923
			(Sheet 3 of 3)

Appendix B
Profile Locations Keyed To Station Locations

Table B1
Profile Locations Keyed To Station Locations

Profile	Station	Profile	Station	Profile	Station
Tutuila 1	TU1	Tutuila 31	TU7	Tutuila 63	TU16
Tutuila 1a	TU1	Tutuila 32	TU7	Tutuila 64	TU16
Tutuila 2	TU1	Tutuila 33	TU7	Tutuila 65	TU16
Tutuila 3	TU1	Tutuila 34	TU8	Tutuila 66	TU16
Tutuila 4	TU1	Tutuila 35	TU8/TU9	Tutuila 67	TU16
Tutuila 5	TU1	Tutuila 36	TU8/TU9	Tutuila 68	TU17
Tutuila 6	TU1	Tutuila 37	TU8/TU9	Tutuila 69	TU17
Tutuila 7	TU2	Tutuila 38	TU8/TU9	Tutuila 70	TU17
Tutuila 8	TU2	Tutuila 39	TU9	Tutuila 71	TU17
Tutuila 9	TU2	Tutuila 40	TU9	Tutuila 72	TU17
Tutuila 10	TU2	Tutuila 41	TU9	Tutuila 73	TU17
Tutuila 11	TU3	Tutuila 42	TU9	Tutuila 74	TU17
Tutuila 12	TU3	Tutuila 43	TU9	Tutuila 75	TU17
Tutuila 13	TU3	Tutuila 44	TU11	Tutuila 76	TU17
Tutuila 14	TU4	Tutuila 45	TU11	Tutuila 77	TU18
Tutuila 15	TU4	Tutuila 46	TU11	Tutuila 78	TU18
Tutuila 16	TU4	Tutuila 47	TU11	Tutuila 79	TU18
Tutuila 17	TU4	Tutuila 48	TU11	Tutuila 80	TU18
Tutuila 18	TU5	Tutuila 49	TU12	Tutuila 81	TU19
Tutuila 19	TU5	Tutuila 50	TU13	Tutuila 82	TU19
Tutuila 20	TU5	Tutuila 51	TU13	Tutuila 83	TU20
Tutuila 21	TU6	Tutuila 52	TU13	Tutuila 84	TU20
Tutuila 22	TU6	Tutuila 53	TU13	Tutuila 85	TU20
Tutuila 23	TU6	Tutuila 54	TU13	Tutuila 86	TU20
Tutuila 24	TU6	Tutuila 55	TU13	Tutuila 87	TU20
Tutuila 25	TU6	Tutuila 56	TU13/TU14	Tutuila 88	TU20/TU21
Tutuila 26	TU7	Tutuila 57	TU13/TU14	Tutuila 89	TU20/TU21
Tutuila 27	TU7	Tutuila 58	TU13/TU14	Tutuila 90	TU21
Tutuila 28	TU7	Tutuila 59	TU13/TU14	Tutuila 91	TU21
Tutuila 29	TU7	Tutuila 60	TU15	Tutuila 92	TU21/TU22
Tutuila 29a	TU7	Tutuila 61	TU15	Tutuila 93	TU21/TU22
Tutuila 30	TU7	Tutuila 62	TU15	Tutuila 94	TU21/TU22

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Table B1 (Continued)					
Profile	**Station**	**Profile**	**Station**	**Profile**	**Station**
Tutuila 95	TU22	Tutuila 125	TU28/TU29	Tutuila 156	TU36
Tutuila 96	TU22	Tutuila 126	TU29	Tutuila 157	TU36
Tutuila 97	TU22/TU23	Tutuila 127	TU29	Tutuila 158	TU36
Tutuila 98	TU22/TU23	Tutuila 128	TU29	Tutuila 159	TU37
Tutuila 99	TU22/TU23	Tutuila 129	TU30	Tutuila 160	TU37
Tutuila 100	TU23/TU24	Tutuila 130	TU30	Tutuila 161	TU37
Tutuila 101	TU23/TU24	Tutuila 131	TU30	Tutuila 162	TU37
Tutuila 102	TU23/TU24	Tutuila 132	TU31	Tutuila 163	TU37/TU38
Tutuila 103	TU24	Tutuila 133	TU31	Tutuila 164	TU38
Tutuila 104	TU24	Tutuila 134	TU31	Tutuila 165	TU38
Tutuila 105	TU24	Tutuila 135	TU31	Tutuila 166	TU38
Tutuila 106	TU24/TU25	Tutuila 136	TU32	Tutuila 167	PA1
Tutuila 107	TU25	Tutuila 137	TU32	Tutuila 168	PA1
Tutuila 108	TU26	Tutuila 138	TU32	Tutuila 169	PA2
Tutuila 109	TU26	Tutuila 139	TU32	Tutuila 170	PA2
Tutuila 109a	TU26	Tutuila 140	TU32	Tutuila 171	PA2
Tutuila 110	TU26	Tutuila 141	TU32	Tutuila 172	PA2
Tutuila 111	TU26	Tutuila 142	TU32	Tutuila 173	PA3
Tutuila 112	TU26	Tutuila 143	TU33	Tutuila 174	PA3
Tutuila 113	TU26	Tutuila 144	TU34	Tutuila 175	PA3
Tutuila 114	TU27	Tutuila 145	TU34	Tutuila 176	PA3
Tutuila 115	TU27	Tutuila 146	TU34	Tutuila 177	PA4
Tutuila 116	TU27	Tutuila 147	TU34	Tutuila 178	PA4
Tutuila 117	TU27	Tutuila 148	TU34	Tutuila 179	PA4
Tutuila 118	TU27	Tutuila 149	TU34	Tutuila 180	PA4
Tutuila 119	TU27	Tutuila 150	TU34	Tutuila 181	PA4
Tutuila 120	TU28	Tutuila 151	TU34/TU35	Tutuila 182	PA5
Tutuila 121	TU28/TU29	Tutuila 152	TU35	Tutuila 183	PA5
Tutuila 122	TU28/TU29	Tutuila 153	TU35	Tutuila 184	PA5
Tutuila 123	TU28/TU29	Tutuila 154	TU35/TU36	Tutuila 185	PA6
Tutuila 124	TU28/TU29	Tutuila 155	TU36	Tutuila 186	PA6

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Table B1 (Continued)					
Profile	**Station**	**Profile**	**Station**	**Profile**	**Station**
Tutuila 187	PA7	Tutuila 218	PA12	Tutuila 248	TU47
Tutuila 188	PA7	Tutuila 219	PA12	Tutuila 249	TU47/TU48
Tutuila 189	PA7	Tutuila 220	PA12	Tutuila 250	TU47/TU48
Tutuila 190	PA8	Tutuila 221	PA12	Tutuila 251	TU47/TU48
Tutuila 191	PA8	Tutuila 222	PA13	Tutuila 252	TU47/TU48
Tutuila 192	PA8	Tutuila 223	PA13	Tutuila 253	TU47/TU48
Tutuila 193	PA8	Tutuila 224	PA13	Tutuila 254	TU47/TU48
Tutuila 194	PA8	Tutuila 225	PA14	Tutuila 255	TU47/TU48
Tutuila 195	PA9	Tutuila 225a	PA14	Tutuila 256	TU47/TU48
Tutuila 196	PA9	Tutuila 226	PA14	Tutuila 257	TU47/TU48
Tutuila 197	PA9	Tutuila 227	PA14	Tutuila 258	TU47/TU48
Tutuila 198	PA9	Tutuila 228	PA14	Tutuila 259	TU47/TU48
Tutuila 199	PA9	Tutuila 229	PA14	Tutuila 260	TU47/TU48
Tutuila 200	PA9	Tutuila 230	PA14	Tutuila 261	TU47/TU48
Tutuila 201	PA9	Tutuila 231	PA14	Tutuila 262	TU48
Tutuila 202	PA10	Tutuila 232	PA14	Tutuila 263	TU48
Tutuila 203	PA10	Tutuila 233	PA14	Tutuila 264	TU49
Tutuila 204	PA10	Tutuila 234	PA14	Tutuila 265	TU49
Tutuila 205	PA10	Tutuila 235	PA14	Tutuila 266	TU49
Tutuila 206	PA10	Tutuila 236	PA14	Tutuila 267	TU49
Tutuila 207	PA10	Tutuila 237	TU46	Tutuila 268	TU49
Tutuila 208	PA10	Tutuila 238	TU46	Tutuila 269	TU49/TU50
Tutuila 209	PA11	Tutuila 239	TU46	Tutuila 270	TU49/TU50
Tutuila 210	PA11	Tutuila 240	TU46/TU47	Tutuila 271	TU49/TU50
Tutuila 211	PA12	Tutuila 241	TU47	Tutuila 272	TU49/TU50
Tutuila 212	PA12	Tutuila 242	TU47	Tutuila 273	TU49/TU50
Tutuila 213	PA12	Tutuila 243	TU47	Tutuila 274	TU50
Tutuila 214	PA12	Tutuila 244	TU47	Tutuila 275	TU50
Tutuila 215	PA12	Tutuila 245	TU47	Tutuila 276	TU50
Tutuila 216	PA12	Tutuila 246	TU47	Tutuila 276a	TU51
Tutuila 217	PA12	Tutuila 247	TU47	Tutuila 277	TU51/TU52

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Table B1 (Concluded)					
Profile	**Station**	**Profile**	**Station**	**Profile**	**Station**
Tutuila 278	TU51/TU52	Tutuila 308	TU57/TU58	Manua 4	TA4
Tutuila 279	TU51/TU52	Tutuila 309	TU58	Manua 5	TA4
Tutuila 280	TU51/TU52	Tutuila 310	TU58	Manua 6	TA3
Tutuila 281	TU51/TU52	Tutuila 311	TU58	Manua 7	TA3
Tutuila 282	TU52	Tutuila 312	TU59	Manua 8	TA2/TA3
Tutuila 283	TU52	Tutuila 313	TU59	Manua 9	TA2/TA3
Tutuila 284	TU52	Tutuila 314	TU59	Manua 10	TA2/TA3
Tutuila 285	TU52	Tutuila 315	TU59	Manua 11	TA2/TA3
Tutuila 286	TU52	Tutuila 316	TU59	Manua 12	TA2/TA3
Tutuila 287	TU52	Tutuila 317	TU59	Manua 13	TA2/TA3
Tutuila 288	TU52/TU53	Tutuila 318	TU59	Manua 14	TA2/TA3
Tutuila 289	TU53	Tutuila 319	TU59	Manua 15	TA2
Tutuila 290	TU53	Tutuila 320	TU59	Manua 16	TA2
Tutuila 291	TU53	Tutuila 321	TU59	Manua 17	TA2
Tutuila 292	TU54	Tutuila 322	TU60	Manua 18	OL6/OL7
Tutuila 293	TU54	Tutuila 323	TU60	Manua 19	OL6/OL7
Tutuila 294	TU54	Tutuila 324	TU60	Manua 20	OL6
Tutuila 295	TU54/TU55	Tutuila 325	TU60	Manua 21	OL6
Tutuila 296	TU55	Tutuila 326	TU60	Manua 22	OL6
Tutuila 297	TU55	Tutuila 327	TU61	Manua 23	OL5/OL6
Tutuila 298	TU55/TU56	Tutuila 328	TU61	Manua 24	OL5/OL6
Tutuila 298a	TU55/TU56	Tutuila 329	TU61	Manua 25	OL5/OL6
Tutuila 299	TU55/TU56	Tutuila 330	TU61	Manua 26	OL5
Tutuila 300	TU56	Aunuu 1	AU1	Manua 27	OL5
Tutuila 301	TU56	Aunuu 2	AU2	Manua 28	OF1
Tutuila 302	TU56/TU57	Aunuu 3	AU2/AU3	Manua 29	OF1
Tutuila 303	TU56/TU57	Aunuu 4	AU3	Manua 30	OF5
Tutuila 304	TU57	Aunuu 5	AU3	Manua 31	OF5
Tutuila 305	TU57	Manua 1	TA4	Manua 32	OF5
Tutuila 306	TU57	Manua 2	TA4	Manua 33	OF5
Tutuila 307	TU57/TU58	Manua 3	TA4		
					(Sheet 4 of 4)

Appendix C
Stage-Frequency Relationship Tables

This appendix contains stage-frequency relationship values for profiles on the five subject islands of American Samoa. Maximum water level (including storm surge, wave ponding on the reef, and wave runup) and its standard deviation are given for seven return intervals for each profile. The tables also include maximum still-water level (including storm surge, wave ponding on the reef, and nearshore wave setup) and its standard deviation for each profile and return interval. The reference datum is msl.

Table C1
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 001

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.4	1.0	0.3	0.4
5	5.8	0.7	2.6	0.4
10	8.0	1.0	3.8	0.5
25	11.4	2.1	5.5	1.0
50	14.6	3.0	6.9	1.4
75	16.7	2.6	7.9	1.3
100	17.8	2.7	8.3	1.4

Table C2
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 001a

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	8.1	4.7	0.3	0.4
5	17.3	0.3	2.6	0.3
10	18.3	0.4	3.8	0.5
25	20.8	2.4	5.4	1.0
50	24.7	4.0	6.9	1.3
75	27.6	3.6	7.9	1.3
100	29.1	3.8	8.3	1.5

Table C3
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 002

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	1.1	0.3	0.4
5	6.7	0.8	2.6	0.4
10	10.1	1.8	3.8	0.5
25	16.3	3.8	5.5	1.0
50	21.8	4.9	6.9	1.4
75	25.4	4.4	7.9	1.3
100	27.2	4.6	8.3	1.4

Table C4
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 003

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.4	1.7	0.3	0.4
5	10.8	1.0	2.6	0.4
10	13.8	1.3	3.8	0.5
25	17.2	1.7	5.5	1.0
50	19.7	2.0	6.9	1.4
75	21.0	1.8	7.9	1.3
100	21.6	2.0	8.3	1.4

Table C5
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 004

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.6	0.3	0.4
5	9.5	1.0	2.6	0.4
10	12.6	1.3	3.8	0.5
25	17.5	3.4	5.5	1.0
50	22.7	4.8	6.9	1.4
75	26.2	4.2	7.9	1.3
100	28.0	4.5	8.3	1.4

Table C6
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 005

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.7	3.1	0.3	0.4
5	11.7	0.6	2.7	0.4
10	13.8	0.9	3.9	0.5
25	17.3	1.9	5.6	0.9
50	20.2	2.5	7.0	1.3
75	22.1	2.4	7.9	1.3
100	23.0	2.6	8.4	1.4

Table C7
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 006

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.4	1.0	0.3	0.4
5	6.1	0.7	2.6	0.4
10	8.4	1.1	3.8	0.5
25	11.9	1.9	5.5	1.0
50	14.8	2.6	6.9	1.4
75	16.6	2.3	7.9	1.3
100	17.5	2.4	8.3	1.4

Table C8
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 007

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.2	0.6	0.4
5	7.4	0.6	3.2	0.3
10	9.8	1.1	4.4	0.5
25	13.4	2.0	6.3	1.2
50	16.6	2.7	8.2	1.7
75	18.7	2.6	9.4	1.6
100	19.7	2.9	10.0	1.8

Table C9
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 008

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.0	1.9	0.6	0.4
5	10.6	1.0	3.2	0.4
10	16.2	2.9	4.4	0.5
25	24.6	4.2	6.4	1.2
50	30.7	5.0	8.2	1.7
75	34.5	5.0	9.4	1.6
100	36.4	5.5	10.0	1.8

Table C10
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 009

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.5	1.7	0.6	0.4
5	9.0	0.7	3.2	0.3
10	11.6	1.1	4.4	0.5
25	14.9	1.5	6.3	1.2
50	17.1	1.9	8.2	1.7
75	18.5	1.9	9.4	1.6
100	19.2	2.1	10.0	1.8

Table C11
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 010

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.9	2.0	0.6	0.4
5	11.2	0.8	3.2	0.4
10	14.7	1.9	4.4	0.5
25	21.2	3.7	6.4	1.2
50	26.8	4.5	8.2	1.7
75	30.1	4.4	9.4	1.6
100	31.8	4.8	10.0	1.8

Table C12
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 011

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.1	2.1	0.5	0.4
5	10.8	0.5	3.0	0.3
10	12.4	0.8	4.1	0.4
25	15.1	1.7	5.9	1.1
50	17.9	2.3	7.6	1.6
75	19.5	2.1	8.7	1.5
100	20.3	2.3	9.2	1.6

Table C13
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 012

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	0.8	0.5	0.4
5	5.0	0.4	3.0	0.3
10	6.4	0.7	4.1	0.4
25	10.1	2.5	5.7	1.1
50	13.9	3.4	7.5	1.6
75	16.5	3.1	8.6	1.5
100	17.8	3.3	9.2	1.7

Table C14
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 013

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.0	0.5	0.4
5	6.3	0.5	3.0	0.3
10	8.1	0.9	4.1	0.4
25	12.1	2.4	5.7	1.1
50	15.8	3.1	7.4	1.6
75	18.1	3.0	8.6	1.5
100	19.3	3.2	9.1	1.7

Table C15
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 014

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.6	1.5	0.5	0.4
5	8.2	0.6	3.1	0.4
10	10.7	1.2	4.4	0.5
25	13.8	1.5	6.3	1.1
50	16.1	2.0	8.1	1.7
75	17.4	1.9	9.2	1.6
100	18.1	2.0	9.8	1.7

Table C16
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 015

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.8	2.1	0.5	0.4
5	10.8	0.5	3.1	0.4
10	12.5	0.8	4.4	0.5
25	14.6	1.0	6.2	1.1
50	16.0	1.2	8.0	1.6
75	16.9	1.2	9.2	1.6
100	17.3	1.4	9.8	1.7

Table C17
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 016

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.2	1.8	0.5	0.4
5	9.5	0.6	3.1	0.4
10	11.9	1.0	4.4	0.5
25	14.7	1.4	6.2	1.1
50	17.0	2.0	8.0	1.7
75	18.4	1.9	9.2	1.6
100	19.0	2.0	9.8	1.7

Table C18
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 017

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.1	0.5	0.4
5	6.8	0.6	3.1	0.4
10	9.8	1.4	4.4	0.5
25	13.4	1.6	6.3	1.1
50	15.9	2.1	8.1	1.7
75	17.4	2.0	9.2	1.6
100	18.1	2.2	9.8	1.7

Table C19
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 018

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.3	0.7	0.6	0.5
5	4.9	0.5	3.2	0.4
10	6.7	0.7	4.4	0.4
25	9.7	2.9	5.9	1.1
50	14.3	4.2	7.8	1.7
75	17.3	3.6	8.9	1.6
100	18.9	3.8	9.6	1.8

Table C20
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 019

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.1	0.6	0.5
5	6.6	0.5	3.2	0.4
10	8.7	1.0	4.4	0.4
25	11.7	1.4	5.9	1.1
50	13.8	1.9	7.8	1.6
75	15.2	1.9	8.9	1.6
100	15.9	2.1	9.5	1.8

Table C21
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 020

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.6	1.5	0.6	0.5
5	9.1	0.8	3.2	0.4
10	12.5	1.6	4.4	0.4
25	17.6	2.5	5.9	1.1
50	21.2	2.9	7.8	1.7
75	23.4	2.8	9.0	1.6
100	24.5	3.1	9.6	1.8

Table C22
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 021

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.1	0.6	0.5
5	6.6	0.6	3.2	0.4
10	9.1	1.3	4.4	0.4
25	12.9	1.8	6.0	1.1
50	15.7	2.5	7.7	1.6
75	17.6	2.5	8.8	1.6
100	18.5	2.8	9.4	1.7

Table C23
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 022

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	1.1	0.6	0.4
5	6.8	0.6	3.2	0.4
10	10.2	1.8	4.4	0.5
25	16.4	3.8	6.1	1.1
50	22.3	5.4	7.8	1.6
75	26.4	4.9	8.9	1.6
100	28.5	5.2	9.5	1.8

Table C24
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 023

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.1	0.6	0.5
5	6.4	0.5	3.2	0.4
10	8.7	1.1	4.4	0.4
25	11.1	0.9	5.9	1.1
50	12.2	1.0	7.7	1.6
75	13.0	1.1	8.8	1.6
100	13.4	1.2	9.4	1.7

Table C25
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 024

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.1	0.6	0.4
5	6.5	0.5	3.2	0.4
10	9.1	1.3	4.4	0.4
25	13.3	2.1	6.0	1.0
50	16.5	2.6	7.7	1.7
75	18.5	2.5	8.9	1.6
100	19.5	2.8	9.5	1.8

Table C26
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 025

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	1.1	0.6	0.5
5	6.4	0.5	3.2	0.4
10	8.7	1.1	4.4	0.4
25	12.4	2.0	5.9	1.1
50	15.4	2.7	7.7	1.6
75	17.5	2.7	8.8	1.6
100	18.5	2.9	9.4	1.7

Table C27
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 026

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.1	0.2	0.2
5	6.1	0.4	1.9	0.3
10	7.4	0.6	3.0	0.5
25	11.0	2.5	5.3	1.3
50	14.9	3.5	7.2	1.8
75	17.5	3.5	8.5	1.8
100	18.9	3.9	9.1	2.0

Table C28
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 027

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.6	1.5	0.2	0.2
5	8.6	0.6	1.9	0.3
10	10.3	0.6	3.0	0.5
25	12.0	0.8	4.9	1.1
50	13.4	1.5	6.8	1.9
75	14.4	1.5	8.2	1.9
100	15.0	1.7	8.9	2.2

Table C29
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 028

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	0.9	0.2	0.2
5	9.0	1.1	1.9	0.3
10	11.1	0.6	3.0	0.5
25	13.2	1.1	4.9	1.2
50	15.0	1.6	6.8	1.6
75	16.1	1.6	7.9	1.5
100	16.6	1.8	8.5	1.6

Table C30
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 029

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.3	0.2	0.2
5	10.4	0.6	1.9	0.3
10	12.0	0.6	3.0	0.5
25	13.9	1.0	4.9	1.1
50	15.6	1.7	6.8	1.9
75	16.9	1.8	8.2	1.9
100	17.5	2.0	8.9	2.2

Table C31
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 029A

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.4	1.4	0.2	0.2
5	10.6	0.7	1.9	0.3
10	13.2	1.2	3.0	0.5
25	16.7	1.3	4.9	1.1
50	18.7	2.0	6.8	1.9
75	20.3	2.1	8.2	1.9
100	21.1	2.4	8.9	2.2

Table C32
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 030

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.7	0.2	0.2
5	10.9	0.5	1.9	0.3
10	12.9	1.0	3.0	0.4
25	15.9	1.3	4.9	1.1
50	17.9	1.9	6.8	1.9
75	19.4	2.0	8.2	1.9
100	20.1	2.3	8.9	2.2

Table C33
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 031

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.9	0.2	0.2
5	6.8	0.7	1.9	0.3
10	9.1	1.1	3.0	0.5
25	12.1	1.5	4.9	1.1
50	14.7	2.5	6.8	1.9
75	16.6	2.4	8.2	1.9
100	17.5	2.7	8.9	2.2

Table C34
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 032

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	1.0	0.2	0.2
5	8.4	0.8	1.9	0.3
10	10.6	0.6	3.0	0.5
25	12.9	1.4	5.0	1.1
50	15.3	2.2	6.8	1.6
75	16.8	2.0	7.9	1.5
100	17.6	2.2	8.5	1.6

Table C35
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 033

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.3	0.2	0.2
5	10.3	0.6	1.9	0.3
10	12.5	1.2	3.0	0.5
25	17.8	3.5	5.0	1.2
50	23.1	5.2	6.9	1.9
75	27.2	5.0	8.3	1.9
100	29.3	5.5	9.0	2.1

Table C36
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 034

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.3	0.7	0.2	0.2
5	6.0	0.9	2.0	0.3
10	8.8	1.0	3.3	0.5
25	10.9	0.8	4.7	0.6
50	12.0	0.9	5.6	0.7
75	12.6	0.9	6.2	0.9
100	12.9	1.1	6.5	1.0

Table C37
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 035

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.7	1.5	0.2	0.2
5	6.5	0.4	2.1	0.4
10	7.7	0.5	3.5	0.5
25	9.7	1.0	5.0	0.6
50	11.3	1.3	5.9	0.8
75	12.3	1.2	6.5	0.9
100	12.8	1.4	6.8	1.1

Table C38
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 036

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.3	0.3	0.2	0.2
5	2.3	0.3	2.3	0.4
10	3.4	0.4	3.6	0.5
25	4.8	0.6	5.2	0.7
50	5.8	1.0	6.3	1.0
75	6.6	1.0	7.1	1.1
100	7.0	1.2	7.5	1.2

Table C39
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 037

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.4	0.3	0.2	0.2
5	2.4	0.3	2.3	0.4
10	3.5	0.4	3.6	0.5
25	4.9	0.7	5.2	0.7
50	6.0	1.0	6.3	1.0
75	6.8	1.1	7.1	1.1
100	7.2	1.2	7.5	1.2

Table C40
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 038

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.8	0.5	0.2	0.2
5	3.7	0.4	2.5	0.4
10	5.0	0.4	3.8	0.5
25	6.1	0.5	5.3	0.8
50	6.8	0.6	6.7	1.2
75	7.4	0.8	7.7	1.2
100	7.6	1.0	8.1	1.4

Table C41
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 039

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.7	0.5	0.2	0.2
5	3.5	0.5	2.6	0.4
10	4.8	0.4	3.8	0.5
25	5.9	0.5	5.4	0.8
50	6.8	0.7	6.8	1.3
75	7.3	0.9	7.8	1.3
100	7.6	1.0	8.3	1.5

Table C42
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 040

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.2	0.7	0.2	0.2
5	5.2	0.6	2.5	0.4
10	7.2	0.8	3.8	0.5
25	9.9	1.5	5.4	0.9
50	12.5	2.2	6.8	1.3
75	14.1	2.0	7.8	1.3
100	14.9	2.1	8.3	1.5

Table C43
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 041

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.6	0.5	0.2	0.2
5	3.0	0.4	2.6	0.4
10	4.9	1.1	3.8	0.5
25	9.6	2.3	5.4	0.8
50	12.8	2.3	6.8	1.3
75	14.6	2.2	7.8	1.3
100	15.4	2.4	8.3	1.5

Table C44
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 042

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.4	0.3	0.2	0.2
5	2.5	0.3	2.6	0.4
10	3.7	0.4	3.8	0.5
25	4.9	0.7	5.4	0.8
50	6.2	1.1	6.8	1.3
75	7.0	1.1	7.8	1.3
100	7.5	1.3	8.3	1.5

Table C45
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 043

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.3	0.7	0.2	0.2
5	5.3	0.5	2.5	0.4
10	7.1	0.7	3.8	0.5
25	9.7	1.6	5.4	0.9
50	12.4	2.4	6.8	1.3
75	14.2	2.1	7.8	1.3
100	15.1	2.3	8.3	1.5

Table C46
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 044

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.3	0.7	0.2	0.3
5	5.8	0.5	2.5	0.4
10	7.5	0.6	3.7	0.4
25	10.3	1.7	5.3	1.0
50	13.0	2.1	7.0	1.6
75	14.6	1.9	8.2	1.5
100	15.4	2.0	8.8	1.7

Table C47
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 045

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.3	0.8	0.2	0.2
5	9.4	1.0	2.5	0.3
10	11.4	0.6	3.7	0.4
25	13.1	0.7	5.4	1.0
50	14.3	0.9	7.1	1.5
75	14.9	1.0	8.2	1.5
100	15.3	1.2	8.8	1.7

Table C48
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 046

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.5	0.9	0.2	0.2
5	5.7	0.4	2.4	0.4
10	7.0	0.5	3.7	0.5
25	8.1	0.5	5.5	1.0
50	8.9	0.7	7.2	1.5
75	9.6	0.9	8.3	1.4
100	9.9	1.2	8.9	1.6

Table C49
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 047

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.9	0.2	0.3
5	6.8	0.4	2.4	0.4
10	7.8	0.3	3.7	0.5
25	8.7	0.4	5.4	1.0
50	9.3	0.6	7.1	1.6
75	9.8	0.8	8.2	1.5
100	10.1	0.9	8.8	1.7

Table C50
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 048

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	1.0	0.2	0.2
5	10.1	0.9	2.5	0.4
10	12.2	0.9	3.8	0.5
25	15.7	1.9	5.5	1.0
50	18.4	2.0	7.1	1.5
75	19.8	1.8	8.2	1.5
100	20.5	1.8	8.8	1.7

Table C51
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 049

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.8	2.1	0.6	0.5
5	10.7	0.6	3.0	0.3
10	12.6	0.6	4.2	0.5
25	14.2	0.7	6.1	1.1
50	15.4	1.1	7.9	1.6
75	16.0	1.1	9.1	1.6
100	16.3	1.2	9.6	1.7

Table C52
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 050

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.1
5	2.4	0.4	1.3	0.3
10	4.0	0.9	1.8	0.2
25	7.7	1.9	3.0	0.6
50	11.0	2.9	3.9	0.8
75	13.1	3.2	4.4	1.0
100	14.2	3.8	4.7	1.1

Table C53
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 051

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.1
5	2.1	0.4	1.3	0.3
10	3.2	0.5	1.8	0.2
25	5.0	0.8	3.0	0.6
50	6.2	1.0	3.9	0.8
75	7.0	1.2	4.4	1.0
100	7.4	1.5	4.7	1.1

Table C54
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 052

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.1
5	2.2	0.3	1.3	0.3
10	3.0	0.3	1.9	0.3
25	3.8	0.4	3.0	0.6
50	4.4	0.5	3.8	0.8
75	4.8	0.6	4.5	1.0
100	5.0	0.7	4.8	1.3

Table C55
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 053

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.1
5	2.9	0.5	1.3	0.3
10	4.1	0.4	1.9	0.3
25	5.1	0.5	2.9	0.6
50	5.9	0.7	3.8	0.8
75	6.4	0.8	4.5	1.0
100	6.7	1.0	4.9	1.3

Table C56
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 054

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.1
5	2.2	0.4	1.3	0.3
10	3.3	0.4	1.9	0.3
25	4.2	0.4	3.0	0.6
50	4.8	0.6	3.8	0.8
75	5.2	0.7	4.5	1.0
100	5.4	0.8	4.8	1.3

Table C57
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 055

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.1
5	2.1	0.4	1.3	0.3
10	3.3	0.6	1.8	0.2
25	5.3	1.0	3.0	0.6
50	6.8	1.4	3.9	0.8
75	7.8	1.6	4.4	1.0
100	8.4	1.9	4.7	1.1

Table C58
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 056

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.5	0.4	0.1	0.2
5	2.7	0.4	1.7	0.2
10	4.1	0.7	2.3	0.3
25	6.2	1.0	3.3	0.6
50	7.6	1.4	4.1	0.8
75	8.6	1.7	4.7	0.9
100	9.1	2.0	4.9	1.1

Table C59
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 057

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.5	0.4	0.1	0.2
5	2.6	0.4	1.8	0.2
10	3.7	0.5	2.5	0.3
25	5.2	0.7	3.5	0.5
50	6.2	1.0	4.2	0.7
75	6.9	1.1	4.8	0.9
100	7.3	1.3	5.0	1.1

Table C60
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 058

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.1	0.7	0.2	0.2
5	4.8	0.6	1.9	0.3
10	6.6	0.6	2.7	0.3
25	8.4	0.7	3.7	0.5
50	9.5	1.1	4.5	0.7
75	10.3	1.3	5.1	0.9
100	10.7	1.5	5.4	1.1

Table C61
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 059

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.9	0.3	0.3
5	6.4	0.9	2.2	0.3
10	9.9	1.3	3.1	0.3
25	12.3	0.8	4.2	0.7
50	13.5	1.1	5.3	1.1
75	14.2	1.2	6.1	1.2
100	14.5	1.4	6.4	1.4

Table C62
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 060

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.9	1.4	0.6	0.5
5	8.0	0.6	3.1	0.3
10	11.9	2.8	4.2	0.4
25	24.9	6.5	5.8	1.0
50	34.6	6.2	7.5	1.5
75	39.4	6.1	8.6	1.5
100	41.8	6.9	9.2	1.7

Table C63
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 061

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.9	1.4	0.6	0.5
5	6.6	0.4	3.1	0.3
10	8.4	0.9	4.2	0.4
25	11.7	1.6	5.9	0.9
50	14.2	2.0	7.5	1.5
75	15.7	2.0	8.6	1.5
100	16.5	2.2	9.2	1.7

Table C64
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 062

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.0	0.6	0.5
5	6.2	0.6	3.1	0.3
10	8.7	1.3	4.2	0.4
25	16.0	4.2	5.8	1.0
50	22.5	4.9	7.5	1.5
75	26.2	4.8	8.6	1.5
100	28.1	5.4	9.2	1.7

Table C65
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 063

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.3	1.6	0.5	0.4
5	10.6	0.8	2.9	0.3
10	13.5	1.5	4.1	0.4
25	19.8	3.1	5.7	0.9
50	24.6	3.3	7.3	1.5
75	27.1	3.2	8.4	1.5
100	28.3	3.6	9.0	1.7

Table C66
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 064

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.4	0.5	0.4
5	8.8	0.9	2.9	0.3
10	14.6	3.8	4.1	0.4
25	25.4	4.4	5.7	0.9
50	31.8	4.4	7.3	1.5
75	35.4	4.3	8.4	1.5
100	37.2	4.8	9.0	1.7

Table C67
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 065

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.9	1.4	0.6	0.4
5	9.0	0.8	2.9	0.3
10	11.3	0.9	4.1	0.4
25	13.6	1.0	5.7	0.9
50	15.1	1.3	7.3	1.5
75	16.0	1.3	8.4	1.5
100	16.5	1.5	9.0	1.6

Table C68
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 066

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.0	0.5	0.4
5	6.6	0.8	2.9	0.3
10	9.6	1.2	4.1	0.4
25	12.7	1.1	5.7	0.9
50	14.5	1.3	7.3	1.5
75	15.5	1.4	8.4	1.5
100	16.0	1.6	9.0	1.6

Table C69
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 067

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.5	1.6	0.6	0.4
5	11.3	0.9	2.9	0.3
10	15.7	2.4	4.1	0.4
25	22.0	2.5	5.7	0.9
50	25.6	2.4	7.3	1.5
75	27.6	2.3	8.4	1.5
100	28.5	2.6	9.0	1.7

Table C70
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 068

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.8	0.2	0.2
5	5.6	0.6	2.3	0.3
10	8.1	1.5	3.4	0.4
25	15.2	5.2	4.9	0.9
50	23.4	7.4	6.6	1.6
75	29.0	6.9	7.7	1.5
100	31.8	7.5	8.3	1.7

Table C71
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 069

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.2	1.6	0.2	0.2
5	7.9	0.4	2.3	0.3
10	9.5	0.8	3.4	0.4
25	12.2	1.3	5.0	1.0
50	14.2	1.7	6.6	1.5
75	15.6	1.7	7.7	1.5
100	16.2	1.9	8.3	1.7

Table C72
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 070

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.8	0.2	0.2
5	4.7	0.4	2.3	0.3
10	6.0	0.4	3.4	0.4
25	7.1	0.5	5.0	0.9
50	7.9	0.7	6.6	1.6
75	8.4	0.9	7.7	1.5
100	8.8	1.0	8.3	1.7

Table C73
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 071

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.9	0.2	0.2
5	5.2	0.4	2.3	0.3
10	6.3	0.4	3.4	0.4
25	7.3	0.5	5.0	1.0
50	8.0	0.6	6.6	1.6
75	8.6	0.8	7.7	1.5
100	8.8	0.9	8.3	1.7

Table C74
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 072

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.9	1.7	0.2	0.2
5	6.9	0.4	2.3	0.3
10	7.7	0.2	3.4	0.4
25	8.3	0.6	4.9	1.0
50	9.6	1.4	6.6	1.5
75	10.6	1.5	7.7	1.5
100	11.1	1.7	8.3	1.7

Table C75
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 073

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.9	0.5	0.2	0.2
5	3.2	0.3	2.3	0.3
10	4.2	0.4	3.4	0.4
25	5.6	0.7	5.0	0.9
50	6.8	1.1	6.6	1.6
75	7.6	1.1	7.7	1.5
100	8.0	1.3	8.3	1.7

Table C76
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 074

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.6	1.1	0.2	0.2
5	5.9	0.3	2.3	0.3
10	6.9	0.4	3.5	0.4
25	8.9	1.4	5.3	1.1
50	11.2	2.0	7.1	1.6
75	12.7	2.1	8.3	1.7
100	13.5	2.4	8.9	1.9

Table C77
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 075

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.8	0.2	0.2
5	5.0	0.4	2.3	0.3
10	6.4	0.6	3.4	0.4
25	8.9	1.5	4.9	0.9
50	11.3	2.2	6.6	1.6
75	13.0	2.1	7.7	1.5
100	13.8	2.4	8.3	1.7

Table C78
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 076

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.2	0.2	0.2
5	8.7	1.2	2.4	0.3
10	13.4	2.5	3.4	0.4
25	22.0	5.1	5.0	0.9
50	29.9	6.9	6.6	1.6
75	35.2	6.6	7.7	1.5
100	38.0	7.2	8.3	1.7

Table C79
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 077

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.1	1.8	0.6	0.5
5	9.6	0.7	3.4	0.4
10	12.1	1.1	4.8	0.6
25	15.3	1.6	7.0	1.3
50	17.8	2.0	9.0	1.7
75	19.3	2.0	10.3	1.8
100	20.1	2.3	11.0	2.1

Table C80
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 078

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	1.1	0.5	0.5
5	7.0	0.8	3.5	0.4
10	10.3	1.5	4.8	0.6
25	14.5	2.0	7.0	1.2
50	17.5	2.6	8.9	1.8
75	19.5	2.6	10.3	1.9
100	20.5	2.9	10.9	2.1

Table C81
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 079

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.5	3.0	0.5	0.4
5	14.3	1.2	3.4	0.4
10	18.9	2.0	4.9	0.6
25	26.0	3.8	7.1	1.2
50	31.7	4.5	9.0	1.8
75	35.2	4.6	10.3	1.8
100	37.0	5.2	11.0	2.1

Table C82
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 080

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.8	0.5	0.5
5	12.0	1.1	3.4	0.4
10	16.1	1.9	4.8	0.6
25	22.3	3.3	7.0	1.2
50	27.3	4.2	9.0	1.7
75	30.6	4.2	10.3	1.8
100	32.3	4.8	11.0	2.1

Table C83
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 081

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.2	2.5	0.9	0.6
5	12.8	0.9	3.8	0.3
10	15.4	1.1	5.1	0.5
25	17.9	1.0	7.1	1.0
50	19.7	1.4	8.8	1.6
75	20.7	1.5	10.0	1.6
100	21.2	1.7	10.6	1.8

Table C84
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 082

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.8	2.2	0.9	0.6
5	11.0	0.7	3.8	0.4
10	13.1	0.9	5.1	0.6
25	16.8	2.4	7.1	1.0
50	20.6	3.5	8.8	1.6
75	23.2	3.3	10.0	1.6
100	24.6	3.7	10.6	1.8

Table C85
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 083

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.5	0.8	0.2	0.2
5	6.8	0.7	2.5	0.4
10	9.2	1.0	3.7	0.4
25	12.3	1.3	5.2	0.8
50	14.2	1.5	6.4	1.1
75	15.2	1.3	7.2	1.1
100	15.7	1.5	7.6	1.2

Table C86
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 084

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.4	0.7	0.2	0.2
5	5.7	0.5	2.5	0.4
10	7.5	0.7	3.7	0.4
25	9.5	0.8	5.2	0.8
50	10.7	1.2	6.5	1.3
75	11.6	1.3	7.4	1.3
100	12.0	1.5	7.9	1.5

Table C87
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 085

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.5	0.8	0.2	0.2
5	6.2	0.5	2.5	0.4
10	7.9	0.7	3.6	0.4
25	10.5	1.3	5.2	0.8
50	12.5	1.7	6.4	1.1
75	13.7	1.5	7.3	1.1
100	14.3	1.6	7.7	1.3

Table C88
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 086

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.3	0.7	0.2	0.2
5	5.4	0.6	2.5	0.3
10	7.4	0.8	3.7	0.4
25	10.0	1.0	5.2	0.8
50	11.4	1.2	6.4	1.1
75	12.2	1.1	7.2	1.1
100	12.6	1.2	7.6	1.2

Table C89
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 087

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.2	0.7	0.3	0.2
5	5.0	0.6	2.4	0.4
10	6.9	0.8	3.7	0.5
25	9.9	1.3	5.2	0.8
50	11.9	1.6	6.4	1.1
75	12.9	1.4	7.2	1.1
100	13.5	1.5	7.6	1.2

Table C90
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 088

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.0	2.0	0.2	0.2
5	11.5	0.5	2.2	0.3
10	13.1	0.6	3.1	0.4
25	14.8	0.7	4.3	0.5
50	15.8	0.8	5.2	0.8
75	16.5	1.0	5.8	1.0
100	16.8	1.2	6.1	1.2

Table C91
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 089

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	1.3	0.2	0.2
5	8.6	0.6	2.2	0.3
10	10.4	0.6	3.2	0.4
25	11.7	0.5	4.3	0.4
50	12.7	0.8	5.1	0.7
75	13.3	1.0	5.7	0.9
100	13.6	1.2	6.0	1.0

Table C92
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 090

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.2	2.0	0.2	0.2
5	10.2	0.4	2.2	0.3
10	11.2	0.3	3.2	0.4
25	12.1	0.4	4.2	0.5
50	12.7	0.6	5.0	0.7
75	13.3	0.8	5.6	0.9
100	13.6	1.0	5.9	1.1

Table C93
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 091

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.8	2.4	0.2	0.2
5	14.0	0.6	2.2	0.3
10	15.8	0.6	3.2	0.4
25	17.3	0.6	4.2	0.5
50	18.4	0.9	5.0	0.8
75	19.0	1.0	5.6	0.9
100	19.3	1.2	5.9	1.0

Table C94
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 092

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.1	0.3	0.2
5	7.0	0.6	2.2	0.3
10	9.2	1.0	3.2	0.4
25	12.0	1.0	4.3	0.5
50	13.4	1.1	5.0	0.7
75	14.2	1.3	5.6	0.9
100	14.6	1.5	5.9	1.0

Table C95
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 093

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	6.6	2.4	0.2	0.2
5	11.6	0.4	2.2	0.3
10	12.6	0.4	3.2	0.4
25	13.5	0.5	4.2	0.5
50	14.4	0.8	5.1	0.7
75	15.1	0.9	5.7	0.9
100	15.4	1.1	6.0	1.1

Table C96
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 094

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.5	1.5	0.2	0.2
5	8.1	0.4	2.2	0.3
10	9.4	0.4	3.2	0.3
25	10.8	0.5	4.2	0.5
50	11.5	0.7	5.0	0.6
75	12.1	0.9	5.6	0.9
100	12.4	1.0	5.9	1.0

Table C97
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 095

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	0.8	0.2	0.2
5	5.3	0.5	2.2	0.3
10	6.9	0.6	3.2	0.4
25	8.7	0.8	4.3	0.5
50	9.9	0.9	5.0	0.7
75	10.6	1.0	5.6	0.9
100	10.9	1.2	5.9	1.0

Table C98
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 096

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.2	1.7	0.2	0.2
5	8.9	0.5	2.2	0.3
10	10.6	0.8	3.2	0.4
25	12.9	1.0	4.2	0.5
50	14.5	1.3	5.0	0.7
75	15.4	1.2	5.6	0.9
100	15.9	1.4	5.9	1.0

Table C99
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 097

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.9	1.8	0.2	0.3
5	9.7	0.3	2.2	0.3
10	10.6	0.3	3.1	0.4
25	11.5	0.4	4.2	0.4
50	12.1	0.6	5.0	0.7
75	12.6	0.7	5.6	0.9
100	12.8	0.9	5.8	1.0

Table C100
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 098

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.7	2.7	0.2	0.2
5	14.0	0.7	2.1	0.3
10	16.0	0.8	3.1	0.4
25	18.9	1.5	4.3	0.6
50	21.0	2.0	5.2	0.9
75	22.5	1.9	5.8	1.0
100	23.3	2.1	6.1	1.1

Table C101
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 099

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	6.8	3.0	0.2	0.2
5	14.8	0.5	2.1	0.3
10	16.0	0.4	3.1	0.4
25	16.9	0.4	4.2	0.6
50	17.6	0.7	5.3	1.0
75	18.1	0.8	5.9	1.1
100	18.3	1.0	6.2	1.2

Table C102
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 100

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.0	0.2	0.2
5	6.1	0.8	2.2	0.3
10	8.8	1.2	3.2	0.4
25	13.3	2.7	4.5	0.6
50	17.4	3.4	5.5	0.9
75	19.9	3.0	6.2	1.0
100	21.2	3.2	6.4	1.2

Table C103
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 101

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.9	1.3	0.2	0.2
5	6.3	0.3	2.2	0.3
10	7.2	0.4	3.2	0.4
25	8.8	1.1	4.6	0.7
50	10.5	1.4	5.7	0.9
75	11.5	1.4	6.3	1.0
100	12.0	1.5	6.6	1.2

Table C104
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 102

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.6	0.2	0.3
5	7.5	0.5	2.3	0.3
10	9.3	0.8	3.2	0.4
25	11.8	1.1	4.8	0.9
50	13.4	1.3	6.1	1.1
75	14.2	1.3	6.9	1.2
100	14.7	1.4	7.3	1.3

Table C105
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 103

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.7	0.2	0.2
5	7.8	0.6	2.3	0.3
10	10.0	1.0	3.3	0.4
25	13.9	2.4	5.0	1.1
50	17.7	3.2	6.8	1.6
75	20.1	2.8	7.9	1.5
100	21.3	3.1	8.5	1.7

Table C106
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 104

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.6	1.8	0.2	0.2
5	7.6	0.3	2.3	0.3
10	8.4	0.3	3.3	0.4
25	10.3	1.6	4.9	1.1
50	13.0	2.6	6.8	1.8
75	14.9	2.5	8.2	1.9
100	15.9	2.7	8.9	2.1

Table C107
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 105

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.2	0.2	0.2
5	7.3	0.9	2.3	0.3
10	10.2	1.0	3.3	0.4
25	12.7	1.0	4.9	1.1
50	14.4	1.3	6.8	1.6
75	15.2	1.4	7.9	1.5
100	15.7	1.5	8.5	1.7

Table C108
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 106

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.7	1.5	0.2	0.3
5	8.0	0.9	2.3	0.3
10	10.3	0.6	3.3	0.4
25	12.5	1.4	4.8	1.1
50	14.7	2.1	6.7	1.8
75	16.2	2.0	7.9	1.8
100	17.0	2.3	8.6	2.0

Table C109
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 107

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.1	0.2	0.3
5	6.4	0.6	2.3	0.3
10	8.1	0.7	3.3	0.4
25	10.6	1.4	4.8	1.0
50	12.7	1.8	6.5	1.6
75	14.0	1.7	7.7	1.6
100	14.6	1.8	8.3	1.7

Table C110
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 108

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.4	2.1	0.3	0.3
5	10.4	0.3	2.4	0.3
10	11.3	0.4	3.3	0.3
25	12.4	0.7	4.7	0.9
50	13.6	1.2	6.4	1.6
75	14.5	1.3	7.5	1.5
100	15.0	1.5	8.1	1.7

Table C111
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 109

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.4	1.4	0.3	0.3
5	7.6	0.5	2.4	0.3
10	9.2	0.6	3.3	0.4
25	11.3	0.9	4.7	0.9
50	12.7	1.3	6.4	1.6
75	13.5	1.3	7.5	1.5
100	14.0	1.5	8.1	1.7

Table C112
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 109A

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.3	1.9	0.3	0.3
5	9.9	0.4	2.4	0.3
10	11.1	0.4	3.3	0.3
25	13.1	1.5	4.7	1.0
50	15.6	2.4	6.4	1.7
75	17.4	2.4	7.7	1.8
100	18.3	2.6	8.3	1.9

Table C113
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 110

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.8	0.3	0.3
5	4.8	0.4	2.4	0.3
10	6.0	0.4	3.3	0.4
25	7.6	1.0	4.7	1.0
50	9.5	1.7	6.5	1.7
75	10.7	1.8	7.7	1.7
100	11.3	1.9	8.3	1.9

Table C114
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 111

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	0.9	0.3	0.3
5	5.4	0.7	2.4	0.3
10	7.7	0.9	3.3	0.3
25	11.1	1.6	4.7	1.0
50	13.4	1.9	6.4	1.6
75	14.7	1.8	7.5	1.5
100	15.4	1.9	8.1	1.7

Table C115
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 112

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.7	2.3	0.3	0.3
5	11.7	0.6	2.4	0.3
10	13.5	0.7	3.3	0.4
25	19.5	7.2	4.7	0.9
50	30.7	10.5	6.4	1.6
75	38.3	9.0	7.5	1.5
100	42.1	9.4	8.1	1.7

Table C116
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 113

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.4	0.8	0.3	0.3
5	5.0	0.5	2.4	0.3
10	6.8	0.7	3.3	0.3
25	9.9	1.8	4.8	0.9
50	12.7	2.4	6.4	1.6
75	14.5	2.2	7.5	1.5
100	15.4	2.4	8.1	1.7

Table C117
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 114

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.8	0.2	0.2
5	4.8	0.4	2.4	0.3
10	6.2	0.7	3.5	0.4
25	9.3	2.3	5.1	1.1
50	13.0	3.2	6.9	1.6
75	15.3	2.9	8.1	1.5
100	16.5	3.0	8.7	1.7

Table C118
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 115

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.7	1.6	0.2	0.2
5	7.3	0.4	2.4	0.4
10	8.6	0.5	3.6	0.5
25	10.7	1.5	5.5	1.1
50	13.2	2.5	7.2	1.8
75	15.1	2.5	8.5	1.9
100	16.1	2.7	9.1	2.1

Table C119
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 116

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.2	0.2	0.3
5	7.9	0.9	2.4	0.3
10	10.6	1.0	3.5	0.4
25	13.8	1.5	5.1	1.1
50	16.1	2.1	6.9	1.6
75	17.6	1.9	8.1	1.5
100	18.4	2.1	8.7	1.7

Table C120
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 117

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	0.9	0.2	0.2
5	5.5	0.6	2.4	0.3
10	7.7	0.9	3.5	0.5
25	11.9	3.2	5.1	1.1
50	16.9	4.6	6.9	1.7
75	20.3	4.0	8.1	1.6
100	22.0	4.2	8.7	1.7

Table C121
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 118

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.9	0.2	0.2
5	5.5	0.8	2.4	0.3
10	9.0	1.6	3.5	0.5
25	16.5	5.8	5.1	1.1
50	25.1	7.8	6.9	1.7
75	30.9	6.8	8.1	1.6
100	33.8	7.2	8.7	1.7

Table C122
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 119

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.5	0.8	0.2	0.2
5	4.9	0.5	2.4	0.3
10	6.9	0.9	3.5	0.5
25	11.3	2.9	5.1	1.1
50	15.6	3.6	6.9	1.7
75	18.2	3.2	8.1	1.6
100	19.6	3.4	8.7	1.7

Table C123
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 120

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.9	0.2	0.2
5	5.4	0.6	1.9	0.3
10	7.5	1.0	2.7	0.3
25	10.4	1.1	4.0	0.8
50	11.9	1.2	5.3	1.1
75	12.8	1.4	6.1	1.1
100	13.2	1.6	6.5	1.3

Table C124
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 121

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.3	0.2	0.2
5	6.4	0.6	2.1	0.3
10	8.2	0.8	2.9	0.3
25	11.2	1.7	4.2	1.0
50	13.9	2.3	5.9	1.6
75	15.5	2.2	7.0	1.5
100	16.4	2.4	7.6	1.6

Table C125
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 122

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.3	0.8	0.2	0.2
5	4.2	0.4	2.1	0.3
10	5.4	0.5	2.9	0.3
25	7.5	1.2	4.2	1.0
50	9.3	1.7	5.9	1.6
75	10.5	1.6	7.0	1.5
100	11.1	1.8	7.6	1.6

Table C126
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 123

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.8	1.5	0.2	0.2
5	6.4	0.3	2.1	0.3
10	7.2	0.3	3.0	0.3
25	8.0	0.4	4.3	1.0
50	8.8	0.7	6.0	1.6
75	9.3	0.8	7.3	1.6
100	9.6	0.9	7.9	1.8

Table C127
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 124

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.7	1.6	0.2	0.2
5	6.3	0.3	2.1	0.3
10	7.1	0.3	2.9	0.3
25	7.8	0.4	4.3	0.9
50	8.5	0.7	5.8	1.5
75	9.1	0.8	6.9	1.4
100	9.4	1.0	7.4	1.6

Table C128
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 125

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.6	0.2	0.2
5	6.1	0.3	1.9	0.3
10	6.9	0.3	2.8	0.3
25	8.2	0.9	4.1	0.9
50	9.8	1.6	5.6	1.4
75	10.9	1.6	6.6	1.4
100	11.5	1.8	7.2	1.6

Table C129
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 126

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.3	2.5	0.3	0.3
5	10.6	0.4	2.3	0.3
10	11.8	0.5	3.3	0.3
25	14.3	2.4	4.9	1.1
50	18.2	3.8	6.9	1.9
75	21.1	3.5	8.2	1.8
100	22.5	3.7	8.9	1.9

Table C130
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 127

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.8	0.3	0.3
5	7.5	0.4	2.4	0.4
10	8.7	0.5	3.3	0.3
25	11.1	1.5	4.9	1.2
50	13.4	1.9	6.9	1.8
75	14.8	1.8	8.2	1.7
100	15.5	2.0	8.9	1.9

Table C131
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 128

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.9	0.3	0.3
5	5.0	0.5	2.4	0.3
10	6.6	0.6	3.3	0.3
25	11.6	5.8	4.9	1.1
50	20.7	8.6	6.9	1.9
75	27.0	7.4	8.2	1.8
100	30.2	7.8	8.9	1.9

Table C132
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 129

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.0	0.5	0.2	0.2
5	3.4	0.3	2.2	0.3
10	4.3	0.4	3.2	0.4
25	5.6	0.9	4.6	0.9
50	7.2	1.5	6.1	1.5
75	8.3	1.5	7.2	1.5
100	8.9	1.7	7.8	1.6

Table C133
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 130

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.4	1.2	0.2	0.2
5	6.3	0.3	2.2	0.3
10	7.0	0.2	3.2	0.4
25	7.4	0.3	4.5	0.9
50	8.1	0.9	6.2	1.6
75	8.7	1.1	7.4	1.7
100	9.0	1.2	7.9	1.9

Table C134
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 131

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.9	0.5	0.2	0.2
5	3.2	0.3	2.2	0.3
10	4.1	0.4	3.2	0.4
25	6.1	1.8	4.6	0.9
50	9.0	2.8	6.1	1.5
75	11.1	2.5	7.2	1.5
100	12.2	2.7	7.8	1.6

Table C135
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 132

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.4	1.6	0.2	0.2
5	6.5	0.3	2.3	0.3
10	7.3	0.3	3.2	0.4
25	8.8	1.3	4.6	1.0
50	11.1	2.2	6.3	1.8
75	12.8	2.1	7.7	1.8
100	13.7	2.3	8.3	2.0

Table C136
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 133

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.3	1.5	0.3	0.2
5	6.1	0.3	2.3	0.3
10	6.8	0.2	3.2	0.4
25	7.3	0.3	4.6	1.0
50	7.9	0.6	6.3	1.7
75	8.4	0.8	7.5	1.6
100	8.6	0.9	8.1	1.8

Table C137
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 134

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.6	0.2	0.2
5	7.1	0.4	2.3	0.3
10	8.2	0.5	3.2	0.4
25	11.4	3.4	4.6	1.0
50	16.8	5.1	6.3	1.7
75	20.5	4.5	7.6	1.6
100	22.5	4.7	8.1	1.7

Table C138
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 135

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.3	1.9	0.3	0.2
5	9.7	0.5	2.3	0.3
10	11.0	0.5	3.2	0.4
25	12.5	0.8	4.6	1.0
50	13.6	1.1	6.3	1.7
75	14.5	1.4	7.5	1.6
100	15.0	1.6	8.1	1.8

Table C139
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 136

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	1.7	0.2	0.2
5	9.2	0.6	2.2	0.3
10	10.7	0.5	3.2	0.4
25	12.5	1.0	4.5	0.9
50	14.2	1.7	6.2	1.7
75	15.5	1.7	7.5	1.7
100	16.1	1.9	8.1	1.9

Table C140
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 137

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	1.8	0.2	0.2
5	9.7	0.6	2.2	0.3
10	11.1	0.5	3.2	0.4
25	12.9	1.1	4.6	0.9
50	14.8	1.9	6.2	1.7
75	16.2	1.9	7.5	1.7
100	16.9	2.1	8.1	1.9

Table C141
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 138

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.3	0.2	0.2
5	7.1	0.5	2.2	0.3
10	8.9	0.7	3.2	0.4
25	11.2	1.5	4.6	0.9
50	13.7	2.3	6.2	1.7
75	15.4	2.2	7.5	1.7
100	16.4	2.5	8.1	1.9

Table C142
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 139

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.9	1.5	0.2	0.2
5	6.8	0.3	2.2	0.3
10	7.7	0.4	3.2	0.4
25	8.6	0.3	4.6	0.9
50	9.2	0.6	6.3	1.7
75	9.8	1.0	7.5	1.7
100	10.1	1.2	8.2	1.9

Table C143
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 140

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.8	1.4	0.2	0.2
5	5.9	0.3	2.2	0.3
10	6.6	0.3	3.2	0.4
25	7.5	0.7	4.6	0.9
50	8.9	1.4	6.2	1.7
75	9.9	1.4	7.5	1.7
100	10.4	1.6	8.1	1.9

Table C144
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 141

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	1.4	0.2	0.2
5	6.0	0.3	2.2	0.3
10	6.8	0.2	3.2	0.4
25	7.6	0.6	4.6	0.9
50	8.9	1.4	6.2	1.7
75	9.9	1.5	7.5	1.7
100	10.5	1.7	8.1	1.8

Table C145
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 142

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.1	0.2	0.2
5	6.2	0.4	2.2	0.3
10	7.4	0.5	3.2	0.4
25	10.8	3.8	4.6	0.9
50	16.9	5.9	6.2	1.7
75	21.3	5.2	7.5	1.7
100	23.5	5.5	8.1	1.9

Table C146
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 143

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.8	1.5	0.3	0.3
5	7.4	0.6	2.4	0.3
10	9.2	0.7	3.2	0.4
25	13.0	3.5	4.7	1.1
50	18.7	5.4	6.6	1.9
75	22.8	4.9	7.9	1.8
100	24.9	5.3	8.6	2.0

Table C147
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 144

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.2	0.2	0.2
5	7.5	0.8	2.4	0.3
10	9.9	0.9	3.3	0.4
25	14.0	3.7	4.8	1.1
50	20.0	5.7	6.8	1.9
75	24.3	5.1	8.2	1.8
100	26.5	5.5	8.9	2.0

Table C148
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 145

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.8	0.2	0.2
5	5.3	0.8	2.3	0.3
10	8.2	1.4	3.3	0.4
25	13.4	3.7	4.8	1.1
50	19.4	5.4	6.8	1.9
75	23.6	5.1	8.2	1.8
100	25.7	5.6	8.9	2.0

Table C149
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 146

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.7	1.8	0.2	0.2
5	10.6	0.7	2.3	0.3
10	12.2	0.6	3.3	0.4
25	14.4	1.6	4.8	1.1
50	17.1	2.5	6.8	1.9
75	19.0	2.5	8.2	1.9
100	20.0	2.8	8.9	2.1

Table C150
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 147

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	1.7	0.2	0.2
5	10.8	1.1	2.3	0.3
10	13.2	0.6	3.3	0.4
25	14.7	0.6	4.9	1.1
50	15.7	0.8	6.8	1.9
75	16.4	1.1	8.2	1.8
100	16.8	1.5	8.9	2.0

Table C151
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 148

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.8	0.2	0.2
5	5.4	0.7	2.3	0.3
10	8.1	1.2	3.3	0.4
25	12.2	2.7	4.8	1.1
50	16.6	4.0	6.8	1.9
75	19.7	3.8	8.2	1.8
100	21.2	4.2	8.9	2.0

Table C152
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 149

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.6	1.6	0.2	0.2
5	10.7	1.2	2.3	0.3
10	14.2	1.4	3.3	0.4
25	19.3	3.9	4.8	1.1
50	25.7	5.9	6.8	1.9
75	30.2	5.5	8.2	1.8
100	32.5	6.1	8.9	2.0

Table C153
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 150

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.9	1.6	0.2	0.2
5	10.7	1.1	2.3	0.3
10	13.4	0.9	3.3	0.4
25	18.4	5.0	4.8	1.1
50	26.3	7.6	6.8	1.9
75	32.0	6.8	8.2	1.8
100	34.8	7.2	8.9	2.0

Table C154
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 151

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.8	2.0	0.2	0.2
5	10.6	0.6	2.4	0.3
10	12.0	0.5	3.4	0.4
25	14.9	2.8	4.9	1.1
50	19.4	4.4	6.9	1.9
75	22.7	4.0	8.3	1.9
100	24.4	4.3	9.1	2.1

Table C155
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 152

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.6	0.2	0.2
5	11.3	1.5	2.4	0.3
10	15.5	1.2	3.5	0.4
25	19.1	1.9	5.0	1.1
50	22.0	2.8	7.0	2.0
75	24.2	2.7	8.5	1.9
100	25.2	3.0	9.2	2.1

Table C156
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 153

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.3	1.7	0.2	0.2
5	11.1	1.2	2.4	0.4
10	15.1	1.6	3.5	0.4
25	19.5	2.2	5.1	1.1
50	22.7	3.1	7.1	1.9
75	25.2	3.0	8.5	1.9
100	26.5	3.4	9.2	2.1

Table C157
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 154

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	0.9	0.2	0.2
5	6.8	1.0	2.4	0.3
10	9.9	1.1	3.3	0.4
25	12.8	1.2	4.8	1.1
50	14.7	1.8	6.8	1.9
75	16.0	1.8	8.2	1.9
100	16.6	2.0	9.0	2.1

Table C158
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 155

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.2	2.1	0.2	0.2
5	12.0	1.1	2.4	0.3
10	15.1	1.1	3.3	0.4
25	20.5	5.5	4.8	1.1
50	29.2	8.2	6.7	1.9
75	35.4	7.3	8.0	1.8
100	38.5	7.7	8.7	2.0

Table C159
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 156

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.3	1.5	0.2	0.2
5	6.8	0.3	2.3	0.4
10	7.9	0.4	3.5	0.4
25	10.6	2.6	5.2	1.1
50	14.9	4.1	7.0	1.7
75	18.0	3.7	8.3	1.7
100	19.6	4.0	8.9	1.8

Table C160
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 157

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.5	0.2	0.2
5	6.6	0.3	2.3	0.3
10	7.6	0.4	3.3	0.4
25	9.5	1.8	4.8	1.1
50	12.4	3.0	6.7	1.9
75	14.6	2.7	8.0	1.8
100	15.8	2.9	8.7	2.0

Table C161
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 158

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.8	0.2	0.2
5	5.0	0.5	2.4	0.3
10	6.5	0.6	3.3	0.4
25	9.2	2.2	4.8	1.1
50	12.9	3.5	6.7	1.9
75	15.6	3.2	8.0	1.8
100	16.9	3.5	8.7	2.0

Table C162
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 159

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.5	0.2	0.2
5	7.0	0.4	2.4	0.3
10	8.3	0.5	3.3	0.4
25	12.5	5.1	4.8	1.1
50	20.5	7.7	6.7	1.9
75	26.2	6.7	8.1	1.8
100	29.0	7.0	8.8	2.0

Table C163
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 160

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.0	0.2	0.2
5	5.3	0.2	2.3	0.3
10	6.1	0.3	3.3	0.4
25	7.1	0.5	4.7	1.1
50	7.9	0.9	6.7	1.9
75	8.6	1.1	8.1	1.9
100	9.0	1.3	8.8	2.1

Table C164
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 161

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.8	0.2	0.2
5	4.9	0.4	2.3	0.3
10	6.2	0.4	3.3	0.4
25	7.3	0.5	4.8	1.1
50	8.1	0.7	6.6	1.9
75	8.6	0.8	8.0	1.8
100	8.8	1.0	8.8	2.0

Table C165
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 162

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	0.9	0.2	0.2
5	5.1	0.4	2.4	0.3
10	6.3	0.5	3.3	0.4
25	8.7	2.3	4.8	1.1
50	12.5	3.7	6.7	1.9
75	15.4	3.4	8.1	1.8
100	16.8	3.6	8.8	2.0

Table C166
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 163

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.8	0.3	0.2
5	4.9	0.5	2.4	0.3
10	6.5	0.6	3.3	0.4
25	10.1	3.5	4.7	1.1
50	15.8	5.5	6.7	1.9
75	19.9	4.9	8.2	1.9
100	22.0	5.2	8.9	2.1

Table C167
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 164

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	0.9	0.3	0.3
5	5.8	1.0	2.3	0.3
10	8.9	1.0	3.3	0.4
25	11.7	1.3	4.8	1.1
50	13.8	1.9	6.8	2.0
75	15.2	2.0	8.3	1.9
100	15.9	2.2	9.0	2.1

Table C168
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 165

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.1	0.3	0.3
5	7.4	1.2	2.3	0.4
10	10.8	0.9	3.3	0.4
25	14.1	2.1	4.8	1.2
50	17.3	2.8	6.9	2.0
75	19.3	2.7	8.3	1.9
100	20.3	2.9	9.0	2.1

Table C169
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 166

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.7	1.8	0.3	0.2
5	7.8	0.5	2.4	0.4
10	9.1	0.5	3.3	0.4
25	12.8	3.8	4.8	1.2
50	19.0	5.9	6.9	2.0
75	23.3	5.2	8.3	1.9
100	25.5	5.6	9.0	2.1

Table C170
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 167

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.8	0.1	0.2
5	8.4	1.8	2.2	0.4
10	11.5	0.7	3.4	0.5
25	13.3	0.8	4.8	0.9
50	14.5	1.1	6.5	1.7
75	15.2	1.2	7.7	1.6
100	15.6	1.3	8.3	1.8

Table C171
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 168

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.8	0.2	0.2
5	7.3	1.5	2.2	0.4
10	10.1	0.6	3.3	0.4
25	15.4	6.4	4.9	1.0
50	25.4	9.5	6.5	1.6
75	32.3	8.2	7.7	1.6
100	35.8	8.6	8.3	1.8

Table C172
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 169

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.5	0.8	0.3	0.3
5	5.1	0.5	3.0	0.4
10	6.4	0.5	4.0	0.4
25	9.0	2.3	5.6	1.0
50	12.8	3.7	7.3	1.8
75	15.6	3.4	8.6	1.8
100	17.1	3.7	9.3	1.9

Table C173
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 170

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	0.9	0.3	0.3
5	6.1	0.5	3.0	0.4
10	7.4	0.5	4.0	0.4
25	9.5	1.9	5.5	1.0
50	12.7	3.1	7.3	1.8
75	15.0	2.9	8.6	1.7
100	16.2	3.1	9.3	1.9

Table C174
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 171

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.0	0.4	0.3
5	5.3	0.3	3.0	0.4
10	6.1	0.4	4.1	0.4
25	7.0	0.5	5.6	1.0
50	7.8	0.9	7.3	1.8
75	8.5	1.0	8.6	1.8
100	8.8	1.2	9.3	2.0

Table C175
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 172

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.9	1.5	0.3	0.4
5	8.9	0.4	3.0	0.4
10	10.0	0.5	4.1	0.4
25	13.9	4.9	5.6	1.0
50	21.8	7.5	7.4	1.7
75	27.3	6.7	8.6	1.7
100	30.1	7.1	9.3	1.9

Table C176
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 173

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.2	0.3	0.3
5	9.3	1.2	2.7	0.4
10	13.3	1.2	3.8	0.4
25	18.9	5.6	5.3	1.0
50	27.7	8.4	7.1	1.8
75	33.9	7.3	8.5	1.8
100	37.0	7.7	9.2	2.0

Table C177
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 174

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.8	1.3	0.3	0.3
5	5.9	0.3	2.7	0.4
10	6.8	0.3	3.8	0.4
25	8.9	2.3	5.3	1.0
50	12.6	3.6	7.2	1.8
75	15.3	3.2	8.5	1.8
100	16.6	3.4	9.2	2.0

Table C178
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 175

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.3	0.3	0.3
5	5.9	0.3	2.7	0.4
10	6.7	0.2	3.8	0.4
25	8.7	2.3	5.4	1.0
50	12.5	3.7	7.2	1.8
75	15.2	3.3	8.5	1.8
100	16.6	3.5	9.2	2.0

Table C179
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 176

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	0.9	0.3	0.3
5	5.2	0.4	2.8	0.3
10	6.4	0.4	3.8	0.4
25	8.7	2.3	5.3	1.1
50	12.6	3.6	7.2	1.8
75	15.3	3.3	8.5	1.8
100	16.7	3.5	9.2	2.0

Table C180
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 177

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.2	1.9	0.3	0.2
5	8.0	0.3	2.4	0.4
10	8.9	0.3	3.5	0.4
25	10.6	1.8	5.2	1.2
50	13.6	3.0	7.2	2.0
75	15.9	2.8	8.7	1.9
100	17.0	3.0	9.5	2.1

Table C181
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 178

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.0	0.3	0.2
5	6.6	0.6	2.5	0.4
10	8.4	0.6	3.5	0.4
25	13.6	6.5	5.1	1.2
50	23.9	9.8	7.2	2.0
75	31.1	8.6	8.7	1.9
100	34.8	9.1	9.5	2.1

Table C182
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 179

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.2	0.6	0.2	0.2
5	4.1	0.3	2.4	0.4
10	4.9	0.4	3.5	0.4
25	6.0	0.5	5.3	1.2
50	7.0	1.0	7.3	2.0
75	7.7	1.1	8.8	1.9
100	8.1	1.3	9.5	2.1

Table C183
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 180

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.9	0.2	0.3
5	5.8	0.4	2.4	0.4
10	6.7	0.4	3.5	0.4
25	7.7	0.4	5.2	1.2
50	8.3	0.7	7.2	2.0
75	8.9	1.0	8.7	1.9
100	9.3	1.3	9.5	2.1

Table C184
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 181

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.5	0.8	0.2	0.2
5	4.9	0.5	2.5	0.4
10	6.3	0.5	3.5	0.4
25	9.0	2.5	5.2	1.2
50	13.2	4.0	7.2	2.0
75	16.2	3.6	8.7	1.9
100	17.7	3.9	9.5	2.1

Table C185
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 182

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.8	0.2	0.2
5	5.3	0.6	2.3	0.4
10	7.2	0.6	3.4	0.4
25	9.6	1.9	4.9	0.9
50	12.8	3.0	6.6	1.5
75	15.1	2.9	7.8	1.6
100	16.3	3.2	8.3	1.8

Table C186
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 183

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.3	1.9	0.2	0.2
5	10.5	0.5	2.4	0.4
10	11.7	0.4	3.5	0.4
25	13.3	1.1	5.1	1.0
50	15.2	1.9	6.7	1.6
75	16.6	1.8	7.9	1.6
100	17.3	2.0	8.5	1.8

Table C187
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 184

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.8	2.0	0.2	0.2
5	10.3	0.4	2.4	0.4
10	11.4	0.4	3.6	0.5
25	14.0	2.6	5.5	1.1
50	18.1	4.1	7.1	1.6
75	21.2	3.8	8.2	1.5
100	22.7	4.1	8.8	1.7

Table C188
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 185

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.6	2.0	0.2	0.2
5	8.6	0.2	2.3	0.4
10	9.5	0.4	3.6	0.5
25	11.2	1.8	5.4	1.2
50	14.2	3.0	7.4	1.9
75	16.4	2.8	8.8	1.8
100	17.5	3.0	9.5	2.0

Table C189
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 186

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.9	1.5	0.2	0.2
5	9.1	0.7	2.3	0.4
10	10.9	0.6	3.6	0.5
25	13.1	1.8	5.3	1.2
50	16.1	2.8	7.4	1.9
75	18.2	2.7	8.8	1.8
100	19.3	3.0	9.5	2.0

Table C190
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 187

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.7	0.5	0.0	0.1
5	3.1	0.3	1.1	0.3
10	4.0	0.4	1.6	0.2
25	5.6	1.6	2.1	0.4
50	8.4	2.7	2.9	1.0
75	10.5	2.5	3.7	1.2
100	11.5	2.8	4.2	1.3

Table C191
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 188

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.7	0.5	0.0	0.1
5	2.9	0.3	1.1	0.3
10	3.7	0.4	1.6	0.2
25	5.2	1.6	2.1	0.4
50	8.0	2.7	2.9	1.0
75	10.1	2.5	3.7	1.2
100	11.1	2.7	4.2	1.3

Table C192
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 189

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.0	0.6	0.0	0.1
5	4.0	0.4	1.1	0.3
10	5.1	0.4	1.6	0.2
25	6.2	0.6	2.1	0.4
50	7.3	1.0	2.9	1.0
75	8.1	1.1	3.8	1.2
100	8.5	1.2	4.2	1.4

Table C193
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 190

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.4	0.3	0.0	0.1
5	2.3	0.3	1.0	0.4
10	3.0	0.3	1.5	0.1
25	3.9	0.6	1.8	0.2
50	5.1	1.3	2.2	0.6
75	5.9	1.4	2.8	0.9
100	6.4	1.5	3.0	1.1

Table C194
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 191

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.9	0.0	0.1
5	5.6	0.3	1.0	0.4
10	6.3	0.3	1.5	0.1
25	7.2	0.3	1.8	0.2
50	7.6	0.3	2.2	0.6
75	7.9	0.5	2.8	0.9
100	8.0	0.7	3.0	1.1

Table C195
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 192

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.6	0.4	0.0	0.1
5	2.6	0.3	1.0	0.4
10	3.2	0.3	1.5	0.1
25	4.0	0.4	1.8	0.2
50	4.7	0.7	2.2	0.6
75	5.2	0.9	2.8	0.9
100	5.5	1.1	3.0	1.1

Table C196
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 193

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.4	0.8	0.0	0.1
5	4.7	0.4	1.0	0.4
10	5.5	0.3	1.5	0.1
25	6.3	0.3	1.8	0.2
50	6.8	0.4	2.2	0.6
75	7.2	0.7	2.8	0.9
100	7.4	0.9	3.0	1.1

Table C197
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 194

Return Period year	Maximum Water Level Level, ft	Maximum Water Level Std. Dev., ft	Maximum Still-Water Level Level, ft	Maximum Still-Water Level Std. Dev., ft
2	1.3	0.8	0.0	0.1
5	4.8	0.4	1.0	0.4
10	5.7	0.4	1.5	0.1
25	6.7	0.6	1.8	0.2
50	7.8	1.2	2.2	0.6
75	8.8	1.3	2.8	0.9
100	9.2	1.5	3.0	1.1

Table C198
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 195

Return Period year	Maximum Water Level Level, ft	Maximum Water Level Std. Dev., ft	Maximum Still-Water Level Level, ft	Maximum Still-Water Level Std. Dev., ft
2	2.0	1.0	0.0	0.1
5	5.3	0.2	1.0	0.4
10	6.2	0.4	1.6	0.1
25	7.2	0.9	1.9	0.2
50	9.0	1.8	2.3	0.6
75	10.3	1.8	2.8	0.9
100	11.0	2.0	3.1	1.1

Table C199
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 196

Return Period year	Maximum Water Level Level, ft	Maximum Water Level Std. Dev., ft	Maximum Still-Water Level Level, ft	Maximum Still-Water Level Std. Dev., ft
2	0.6	0.4	0.0	0.1
5	2.5	0.3	1.0	0.4
10	3.2	0.2	1.6	0.1
25	3.9	0.3	1.9	0.2
50	4.4	0.5	2.3	0.6
75	4.8	0.8	2.8	0.9
100	5.1	0.9	3.1	1.1

Table C200
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 197

Return Period year	Maximum Water Level Level, ft	Maximum Water Level Std. Dev., ft	Maximum Still-Water Level Level, ft	Maximum Still-Water Level Std. Dev., ft
2	0.4	0.3	0.0	0.1
5	2.2	0.2	1.0	0.4
10	2.8	0.2	1.6	0.1
25	3.5	0.3	1.9	0.2
50	4.1	0.6	2.3	0.6
75	4.6	0.8	2.8	0.9
100	4.8	1.0	3.1	1.1

Table C201
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 198

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.9	0.6	0.0	0.1
5	3.3	0.3	1.0	0.4
10	4.0	0.3	1.6	0.1
25	4.9	0.5	1.9	0.2
50	5.8	0.9	2.3	0.6
75	6.4	1.0	2.8	0.9
100	6.8	1.2	3.1	1.1

Table C202
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 199

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.8	0.5	0.0	0.1
5	3.0	0.3	1.0	0.4
10	3.7	0.3	1.6	0.1
25	4.4	0.3	1.9	0.2
50	4.9	0.5	2.3	0.6
75	5.4	0.8	2.8	0.9
100	5.6	0.9	3.1	1.1

Table C203
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 200

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.3	0.3	0.0	0.1
5	1.9	0.2	1.0	0.4
10	2.6	0.3	1.6	0.1
25	3.2	0.3	1.9	0.2
50	3.8	0.6	2.3	0.6
75	4.3	0.9	2.8	0.9
100	4.6	1.1	3.1	1.1

Table C204
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 201

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.5	0.8	0.0	0.1
5	4.7	0.3	1.0	0.4
10	5.5	0.3	1.6	0.1
25	6.4	0.3	1.9	0.2
50	6.9	0.6	2.3	0.6
75	7.4	0.9	2.8	0.9
100	7.7	1.0	3.1	1.1

Table C205
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 202

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.1	0.0	0.0
5	1.3	0.2	0.9	0.4
10	2.0	0.2	1.4	0.1
25	2.5	0.4	1.6	0.2
50	3.4	1.0	2.0	0.6
75	4.0	1.1	2.5	0.9
100	4.4	1.3	2.7	1.1

Table C206
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 203

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.0
5	2.0	0.2	0.9	0.4
10	2.7	0.3	1.4	0.1
25	3.8	0.8	1.6	0.2
50	5.2	1.5	2.0	0.6
75	6.2	1.5	2.5	0.9
100	6.7	1.6	2.7	1.1

Table C207
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 204

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.0
5	2.0	0.2	0.9	0.4
10	2.7	0.3	1.4	0.1
25	3.5	0.4	1.6	0.2
50	4.3	0.9	2.0	0.6
75	5.0	1.1	2.5	0.9
100	5.3	1.3	2.7	1.1

Table C208
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 205

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.0
5	2.0	0.2	0.9	0.4
10	2.7	0.3	1.4	0.1
25	3.5	0.4	1.6	0.2
50	4.3	0.9	2.0	0.6
75	4.9	1.1	2.5	0.9
100	5.2	1.2	2.7	1.1

Table C209
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 206

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.1	0.0	0.0
5	1.0	0.4	0.9	0.4
10	1.6	0.1	1.4	0.1
25	1.9	0.2	1.6	0.2
50	2.4	0.7	2.0	0.6
75	2.9	0.9	2.5	0.9
100	3.2	1.1	2.7	1.1

Table C210
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 207

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.1	0.0	0.0
5	1.2	0.3	0.9	0.4
10	1.8	0.2	1.4	0.1
25	2.2	0.2	1.6	0.2
50	2.7	0.7	2.0	0.6
75	3.2	0.9	2.5	0.9
100	3.5	1.1	2.7	1.1

Table C211
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 208

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.2	0.2	0.0	0.0
5	2.0	0.2	0.9	0.4
10	2.7	0.3	1.4	0.1
25	3.5	0.5	1.6	0.2
50	4.3	0.9	2.0	0.6
75	5.1	1.1	2.5	0.9
100	5.4	1.3	2.7	1.1

Table C212
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 209

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.0
5	1.8	0.2	0.9	0.4
10	2.5	0.4	1.4	0.1
25	3.7	0.9	1.6	0.2
50	5.3	1.7	2.0	0.6
75	6.6	1.7	2.5	0.9
100	7.2	1.9	2.7	1.1

Table C213
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 210

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.0
5	1.9	0.2	0.9	0.5
10	2.5	0.3	1.4	0.1
25	3.5	0.7	1.6	0.2
50	4.8	1.4	2.0	0.6
75	5.9	1.4	2.5	0.9
100	6.4	1.6	2.7	1.1

Table C214
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 211

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.4	0.4	0.0	0.0
5	2.7	0.3	0.9	0.4
10	3.5	0.3	1.5	0.1
25	4.6	0.6	1.7	0.2
50	5.6	0.9	2.1	0.6
75	6.2	1.1	2.6	0.9
100	6.5	1.2	2.9	1.1

Table C215
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 212

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.1	0.0	0.0
5	1.2	0.3	0.9	0.4
10	1.8	0.2	1.5	0.1
25	2.3	0.3	1.7	0.2
50	2.8	0.8	2.1	0.6
75	3.4	1.0	2.6	0.9
100	3.7	1.2	2.9	1.1

Table C216
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 213

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.0
5	1.7	0.2	0.9	0.4
10	2.3	0.3	1.5	0.1
25	3.2	0.7	1.7	0.2
50	4.6	1.4	2.1	0.6
75	5.6	1.4	2.6	0.9
100	6.1	1.6	2.9	1.1

Table C217
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 214

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.0
5	1.5	0.2	0.9	0.4
10	2.1	0.2	1.5	0.1
25	2.9	0.5	1.7	0.2
50	3.9	1.1	2.1	0.6
75	4.7	1.3	2.6	0.9
100	5.1	1.5	2.9	1.1

Table C218
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 215

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.0
5	1.8	0.2	0.9	0.4
10	2.4	0.3	1.5	0.1
25	3.2	0.5	1.7	0.2
50	4.2	1.0	2.1	0.6
75	5.0	1.2	2.6	0.9
100	5.4	1.4	2.9	1.1

Table C219
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 216

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.1	0.2	0.0	0.0
5	1.7	0.2	0.9	0.4
10	2.3	0.3	1.5	0.1
25	3.2	0.6	1.7	0.2
50	4.5	1.3	2.1	0.6
75	5.4	1.3	2.6	0.9
100	5.9	1.5	2.9	1.1

Table C220
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 217

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.2	0.2	0.0	0.0
5	1.9	0.2	0.9	0.4
10	2.5	0.3	1.5	0.1
25	3.5	0.6	1.7	0.2
50	4.8	1.3	2.1	0.6
75	5.8	1.4	2.6	0.9
100	6.2	1.5	2.9	1.1

Table C221
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 218

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.3	0.4	0.0	0.0
5	2.5	0.3	0.9	0.4
10	3.3	0.3	1.5	0.1
25	4.4	0.6	1.7	0.2
50	5.4	1.0	2.1	0.6
75	6.1	1.2	2.6	0.9
100	6.4	1.4	2.9	1.1

Table C222
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 219

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.3	0.4	0.0	0.0
5	2.5	0.3	0.9	0.4
10	3.3	0.3	1.5	0.1
25	4.6	0.9	1.7	0.2
50	6.3	1.6	2.1	0.6
75	7.4	1.6	2.6	0.9
100	8.0	1.8	2.9	1.1

Table C223
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 220

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.3	0.3	0.0	0.0
5	2.4	0.3	0.9	0.4
10	3.1	0.3	1.5	0.1
25	4.6	1.4	1.7	0.2
50	7.0	2.3	2.1	0.6
75	8.7	2.1	2.6	0.9
100	9.6	2.3	2.9	1.1

Table C224
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 221

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.4	0.4	0.0	0.0
5	2.8	0.4	0.9	0.4
10	3.8	0.4	1.5	0.1
25	5.1	0.6	1.7	0.2
50	6.2	0.9	2.1	0.6
75	6.8	1.1	2.6	0.9
100	7.1	1.2	2.9	1.1

Table C225
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 222

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	1.3	0.1	0.1
5	7.4	0.8	1.5	0.3
10	11.9	2.5	2.1	0.3
25	21.2	7.2	3.8	1.4
50	32.4	9.4	6.2	2.2
75	39.3	8.3	7.8	2.0
100	42.8	8.9	8.6	2.2

Table C226
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 223

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	1.3	0.1	0.1
5	7.2	0.8	1.5	0.3
10	9.7	1.1	2.1	0.3
25	13.1	2.0	3.8	1.5
50	16.2	2.8	6.3	2.4
75	18.4	2.7	8.1	2.2
100	19.5	3.0	9.0	2.4

Table C227
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 224

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.5	1.1	0.1	0.1
5	6.0	0.8	1.5	0.3
10	9.8	1.9	2.1	0.3
25	17.2	6.3	3.8	1.5
50	27.1	8.6	6.3	2.2
75	33.5	7.6	7.9	2.0
100	36.7	8.0	8.7	2.2

Table C228
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 225

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.2	0.8	0.1	0.1
5	4.6	0.4	1.5	0.3
10	5.8	0.5	2.1	0.3
25	8.7	2.5	4.1	1.5
50	12.9	4.0	6.7	2.4
75	15.9	3.7	8.5	2.3
100	17.5	4.0	9.5	2.6

Table C229
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 225a

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	1.4	0.1	0.1
5	7.6	0.5	1.5	0.3
10	9.6	1.3	2.1	0.3
25	13.7	2.0	4.0	1.6
50	16.3	2.5	6.6	2.3
75	18.1	2.7	8.3	2.1
100	19.0	3.1	9.2	2.3

Table C230
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 226

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.0	0.7	0.1	0.1
5	3.7	0.4	1.5	0.3
10	4.9	0.6	2.1	0.3
25	7.9	2.8	4.0	1.6
50	12.6	4.1	6.6	2.3
75	15.6	3.6	8.3	2.1
100	17.2	3.8	9.2	2.3

Table C231
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 227

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.0	0.7	0.1	0.1
5	3.7	0.5	1.5	0.3
10	5.6	1.5	2.1	0.3
25	13.3	5.9	3.9	1.6
50	22.4	7.6	6.6	2.3
75	28.0	6.7	8.3	2.1
100	30.9	7.1	9.2	2.3

Table C232
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 228

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.6	0.5	0.1	0.1
5	2.9	0.4	1.5	0.3
10	3.9	0.5	2.1	0.3
25	7.1	3.3	4.0	1.5
50	12.4	4.7	6.6	2.3
75	15.9	4.1	8.3	2.1
100	17.6	4.3	9.2	2.3

Table C233
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 229

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.9	0.6	0.1	0.1
5	3.5	0.4	1.5	0.3
10	4.6	0.5	2.1	0.3
25	6.3	0.9	4.0	1.6
50	7.8	1.2	6.6	2.3
75	8.7	1.2	8.3	2.1
100	9.1	1.4	9.2	2.3

Table C234
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 230

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.8	0.5	0.1	0.1
5	2.9	0.3	1.5	0.3
10	3.7	0.2	2.1	0.3
25	4.7	0.8	4.1	1.6
50	6.3	1.5	6.7	2.3
75	7.4	1.5	8.3	2.1
100	8.0	1.7	9.2	2.3

Table C235
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 231

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.7	0.5	0.1	0.1
5	3.0	0.4	1.5	0.3
10	4.1	0.6	2.1	0.3
25	7.5	3.1	4.0	1.6
50	12.5	4.4	6.6	2.3
75	15.8	3.9	8.3	2.1
100	17.5	4.1	9.2	2.3

Table C236
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 232

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.0	0.7	0.1	0.1
5	3.6	0.4	1.5	0.3
10	4.9	0.8	2.1	0.3
25	9.9	5.2	3.9	1.6
50	18.2	7.4	6.6	2.3
75	23.6	6.4	8.3	2.1
100	26.3	6.7	9.2	2.3

Table C237
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 233

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.0	0.7	0.1	0.1
5	3.8	0.5	1.5	0.3
10	5.0	0.5	2.1	0.3
25	7.9	2.8	4.0	1.5
50	12.5	4.4	6.6	2.3
75	15.7	3.8	8.3	2.1
100	17.4	4.0	9.2	2.3

Table C238
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 234

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.0	0.7	0.1	0.1
5	3.6	0.4	1.5	0.3
10	4.8	0.6	2.1	0.3
25	7.9	2.9	4.0	1.6
50	12.6	4.1	6.6	2.3
75	15.6	3.6	8.3	2.1
100	17.2	3.8	9.2	2.3

Table C239
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 235

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.5	0.4	0.1	0.1
5	2.6	0.4	1.5	0.3
10	3.4	0.4	2.1	0.3
25	6.5	3.3	3.8	1.5
50	11.8	4.8	6.3	2.2
75	15.3	4.2	7.9	2.0
100	17.1	4.4	8.7	2.2

Table C240
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 236

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.9	0.6	0.1	0.1
5	3.3	0.4	1.5	0.3
10	4.4	0.5	2.0	0.3
25	7.7	3.0	3.8	1.5
50	12.5	4.3	6.3	2.2
75	15.7	3.8	7.9	2.0
100	17.3	3.9	8.7	2.2

Table C241
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 237

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.2	0.2	0.2
5	8.6	1.3	2.2	0.4
10	11.2	0.6	3.2	0.4
25	13.4	1.4	4.5	0.8
50	15.6	2.1	6.0	1.5
75	17.1	2.0	7.0	1.5
100	17.9	2.2	7.5	1.6

Table C242
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 238

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.5	1.4	0.2	0.2
5	9.4	1.1	2.2	0.3
10	11.6	0.4	3.2	0.4
25	12.8	0.6	4.4	0.8
50	13.7	0.8	6.0	1.5
75	14.2	0.9	7.0	1.4
100	14.5	1.0	7.6	1.6

Table C243
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 239

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.3	0.6	0.2	0.2
5	4.3	0.4	2.2	0.3
10	5.7	0.4	3.2	0.4
25	7.8	1.7	4.4	0.8
50	10.7	2.7	5.9	1.5
75	12.7	2.5	7.0	1.5
100	13.7	2.7	7.6	1.6

Table C244
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 240

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.2	0.2	0.2
5	8.5	1.5	2.3	0.4
10	11.9	1.0	3.3	0.4
25	17.7	6.4	4.8	1.0
50	27.9	9.7	6.6	1.8
75	35.1	8.6	7.9	1.8
100	38.8	9.2	8.5	2.0

Table C245
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 241

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.0	2.1	0.2	0.2
5	11.8	1.0	2.4	0.4
10	14.0	0.7	3.6	0.4
25	19.6	7.1	5.2	1.2
50	31.0	10.5	7.4	2.0
75	38.8	9.3	8.9	1.9
100	42.8	9.9	9.7	2.1

Table C246
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 242

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.5	0.2	0.2
5	10.0	0.8	2.4	0.4
10	11.5	0.6	3.5	0.5
25	13.4	1.2	5.2	1.2
50	15.2	1.8	7.3	2.0
75	16.5	1.8	8.9	2.0
100	17.2	1.9	9.7	2.2

Table C247
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 243

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.3	1.8	0.2	0.2
5	10.2	0.6	2.4	0.4
10	11.6	0.5	3.6	0.4
25	14.0	2.2	5.3	1.2
50	17.6	3.4	7.4	2.0
75	20.3	3.2	8.9	1.9
100	21.6	3.5	9.7	2.1

Table C248
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 244

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.8	1.5	0.2	0.2
5	10.1	1.2	2.4	0.4
10	12.9	0.9	3.5	0.4
25	17.9	4.9	5.2	1.2
50	26.0	7.6	7.4	2.0
75	31.8	7.0	8.9	2.0
100	34.7	7.6	9.7	2.2

Table C249
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 245

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.4	0.2	0.2
5	7.2	0.5	2.4	0.4
10	8.7	0.6	3.5	0.4
25	11.1	1.8	5.2	1.2
50	14.2	3.0	7.3	2.1
75	16.5	2.8	8.9	2.0
100	17.7	3.1	9.6	2.2

Table C250
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 246

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.0	0.2	0.2
5	6.5	0.7	2.5	0.4
10	8.6	0.8	3.5	0.4
25	11.4	1.8	5.2	1.2
50	14.4	2.9	7.3	2.1
75	16.7	2.8	8.9	2.0
100	17.8	3.2	9.6	2.2

Table C251
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 247

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	0.9	0.2	0.2
5	6.0	0.7	2.5	0.4
10	8.1	0.8	3.5	0.4
25	11.0	2.0	5.2	1.2
50	14.3	3.2	7.3	2.1
75	16.8	3.0	8.9	2.0
100	18.0	3.4	9.6	2.2

Table C252
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 248

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.8	0.2	0.2
5	13.2	1.7	2.4	0.4
10	17.1	1.1	3.6	0.4
25	22.2	4.0	5.2	1.2
50	28.6	6.2	7.4	2.0
75	33.4	5.8	8.9	1.9
100	35.9	6.2	9.7	2.1

Table C253
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 249

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.1	0.2	0.2
5	8.6	1.2	2.3	0.3
10	11.2	0.7	3.4	0.4
25	14.0	2.1	4.9	1.1
50	17.4	3.3	7.0	2.0
75	19.9	3.1	8.5	1.9
100	21.2	3.3	9.2	2.1

Table C254
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 250

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.0	2.0	0.2	0.2
5	10.8	1.0	2.2	0.3
10	13.2	0.7	3.2	0.4
25	20.0	9.2	4.6	1.0
50	34.3	13.6	6.5	1.8
75	44.1	11.7	7.8	1.8
100	49.1	12.2	8.4	1.9

Table C255
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 251

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.8	0.2	0.2
5	9.7	0.6	2.2	0.3
10	11.0	0.4	3.2	0.4
25	12.4	0.9	4.6	1.0
50	14.1	1.7	6.5	1.8
75	15.3	1.7	7.8	1.8
100	15.9	1.9	8.4	1.9

Table C256
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 252

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.5	1.9	0.2	0.2
5	11.1	1.5	2.2	0.3
10	14.8	0.8	3.2	0.4
25	17.7	2.0	4.6	1.0
50	21.2	3.0	6.5	1.8
75	23.5	2.8	7.8	1.8
100	24.7	3.1	8.4	1.9

Table C257
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 253

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.7	2.0	0.2	0.2
5	10.3	0.6	2.2	0.3
10	12.1	0.6	3.2	0.4
25	18.6	9.0	4.6	1.0
50	32.5	13.0	6.5	1.7
75	41.9	11.1	7.8	1.6
100	46.6	11.6	8.4	1.8

Table C258
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 254

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.7	2.0	0.2	0.2
5	10.7	0.8	2.2	0.3
10	12.6	0.6	3.1	0.4
25	15.9	3.6	4.6	1.0
50	21.6	5.4	6.3	1.7
75	25.6	4.7	7.6	1.7
100	27.7	5.0	8.3	1.9

Table C259
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 255

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.4	1.7	0.2	0.2
5	7.9	0.5	2.1	0.3
10	9.4	0.5	3.1	0.4
25	11.9	2.3	4.5	1.0
50	15.7	3.5	6.3	1.7
75	18.3	3.1	7.5	1.7
100	19.6	3.3	8.2	1.8

Table C260
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 256

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.5	1.9	0.2	0.2
5	9.5	0.7	2.1	0.3
10	11.1	0.5	3.0	0.4
25	16.1	6.7	4.5	0.9
50	26.5	9.9	6.2	1.6
75	33.7	8.5	7.4	1.6
100	37.3	8.9	8.1	1.8

Table C261
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 257

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.9	0.2	0.2
5	5.9	0.6	2.1	0.3
10	7.7	0.6	3.1	0.4
25	10.4	2.4	4.5	0.9
50	14.4	3.5	6.2	1.7
75	17.0	3.1	7.4	1.6
100	18.3	3.3	8.1	1.8

Table C262
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 258

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.7	0.2	0.2
5	9.5	1.0	2.1	0.3
10	12.6	1.0	3.0	0.4
25	18.2	5.0	4.5	0.9
50	26.2	7.4	6.2	1.6
75	31.7	6.5	7.4	1.6
100	34.5	6.8	8.1	1.8

Table C263
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 259

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.6	0.2	0.2
5	9.3	1.0	2.1	0.3
10	12.0	0.9	3.1	0.4
25	15.3	2.1	4.4	1.0
50	18.7	2.9	6.2	1.7
75	20.9	2.7	7.4	1.6
100	22.0	2.8	8.1	1.7

Table C264
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 260

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.9	2.1	0.2	0.2
5	10.5	0.7	2.1	0.3
10	12.1	0.5	3.0	0.4
25	17.1	6.4	4.4	0.9
50	27.1	9.4	6.2	1.6
75	34.0	8.1	7.4	1.5
100	37.5	8.4	8.0	1.7

Table C265
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 261

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	1.8	0.2	0.2
5	9.6	0.8	2.1	0.3
10	11.5	0.5	3.0	0.4
25	13.3	0.9	4.4	0.9
50	14.6	1.3	6.2	1.6
75	15.5	1.3	7.4	1.5
100	15.9	1.4	8.0	1.7

Table C266
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 262

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.4	0.2	0.2
5	10.2	1.2	2.0	0.3
10	13.4	0.9	3.0	0.4
25	16.2	1.1	4.5	0.9
50	17.6	1.3	6.1	1.5
75	18.6	1.5	7.2	1.4
100	19.1	1.8	7.7	1.6

Table C267
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 263

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.1	0.6	0.2	0.2
5	4.0	0.4	2.0	0.3
10	5.3	0.5	3.0	0.4
25	7.3	1.4	4.5	0.9
50	9.8	2.2	6.1	1.5
75	11.5	2.0	7.2	1.4
100	12.3	2.2	7.7	1.6

Table C268
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 264

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C269
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 265

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C270
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 266

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C271
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 267

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C272
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 268

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C273
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 269

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C274
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 270

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C275
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 271

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C276
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 272

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C277
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 273

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C278
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 274

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C279
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 275

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C280
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 276

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.0	0.0	0.0	0.0
5	0.9	0.5	0.9	0.5
10	1.4	0.1	1.4	0.1
25	1.6	0.2	1.6	0.2
50	2.0	0.6	2.0	0.6
75	2.5	0.9	2.5	0.9
100	2.8	1.1	2.8	1.1

Table C281
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 276a

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.2	0.2	0.2
5	7.1	0.8	2.3	0.3
10	9.4	0.8	3.2	0.4
25	15.2	6.4	4.7	1.1
50	25.2	9.4	6.7	1.9
75	32.1	8.1	8.1	1.8
100	35.6	8.5	8.8	2.0

Table C282
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 277

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.8	0.2	0.2
5	5.0	0.5	2.0	0.3
10	6.6	0.6	2.9	0.4
25	10.3	4.2	4.3	1.1
50	17.1	6.3	6.2	1.9
75	21.7	5.4	7.6	1.8
100	24.0	5.7	8.3	2.0

Table C283
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 278

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.9	1.5	0.2	0.2
5	10.0	1.5	2.0	0.3
10	13.4	0.9	2.8	0.3
25	18.5	5.3	4.2	1.1
50	26.8	7.6	6.3	2.0
75	32.5	6.6	7.8	1.9
100	35.3	6.9	8.6	2.1

Table C284
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 279

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.8	3.3	0.2	0.2
5	15.5	0.9	2.0	0.2
10	17.8	0.8	2.8	0.4
25	24.4	8.1	4.1	0.9
50	37.0	12.1	5.7	1.7
75	45.8	10.5	6.9	1.7
100	50.3	11.0	7.6	1.9

Table C285
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 280

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.5	1.6	0.2	0.2
5	7.0	0.3	1.8	0.2
10	7.9	0.3	2.5	0.3
25	10.0	2.4	3.7	0.8
50	14.0	3.9	5.2	1.5
75	16.9	3.5	6.2	1.5
100	18.4	3.8	6.8	1.6

Table C286
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 281

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.2	0.2	0.2
5	6.6	0.4	1.8	0.2
10	7.7	0.4	2.4	0.3
25	10.1	2.3	3.5	0.7
50	14.0	3.7	4.9	1.5
75	16.8	3.4	6.1	1.5
100	18.2	3.6	6.6	1.7

Table C287
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 282

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.9	0.1	0.2
5	5.3	0.5	1.6	0.2
10	6.6	0.5	2.2	0.3
25	8.8	2.0	3.0	0.6
50	12.2	3.2	4.2	1.3
75	14.6	2.9	5.2	1.4
100	15.8	3.1	5.7	1.5

Table C288
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 283

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.9	0.1	0.2
5	5.4	0.5	1.6	0.2
10	6.6	0.5	2.2	0.3
25	8.8	1.9	3.0	0.6
50	12.1	3.1	4.2	1.3
75	14.4	2.8	5.2	1.4
100	15.6	3.0	5.7	1.5

Table C289
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 284

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	0.9	0.1	0.2
5	5.5	0.4	1.6	0.2
10	6.7	0.4	2.2	0.3
25	9.0	2.4	3.0	0.6
50	13.1	3.8	4.2	1.3
75	15.9	3.4	5.2	1.4
100	17.3	3.6	5.7	1.5

Table C290
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 285

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.2	2.4	0.1	0.2
5	10.8	0.3	1.6	0.2
10	11.7	0.4	2.2	0.3
25	13.3	1.5	3.1	0.6
50	16.0	2.7	4.3	1.2
75	18.0	2.5	5.2	1.3
100	19.0	2.7	5.7	1.5

Table C291
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 286

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	1.6	0.1	0.2
5	7.1	0.3	1.6	0.2
10	8.1	0.4	2.2	0.3
25	10.3	2.0	3.0	0.6
50	13.8	3.3	4.2	1.3
75	16.3	3.2	5.2	1.4
100	17.6	3.5	5.7	1.5

Table C292
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 287

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.6	2.7	0.1	0.2
5	10.9	0.3	1.6	0.2
10	11.9	0.4	2.2	0.3
25	13.4	1.2	3.2	0.6
50	15.7	2.2	4.4	1.4
75	17.3	2.2	5.4	1.4
100	18.2	2.4	5.8	1.5

Table C293
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 288

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.2	2.1	0.1	0.2
5	10.0	0.4	1.6	0.2
10	10.9	0.4	2.2	0.3
25	12.6	1.4	3.1	0.6
50	15.0	2.4	4.3	1.3
75	16.8	2.2	5.2	1.4
100	17.7	2.4	5.7	1.5

Table C294
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 289

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.1	0.1	0.2
5	5.9	0.5	1.6	0.2
10	7.3	0.5	2.2	0.3
25	10.8	4.1	3.0	0.6
50	17.3	6.2	4.3	1.3
75	21.9	5.4	5.2	1.4
100	24.3	5.7	5.7	1.5

Table C295
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 290

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.3	0.8	0.1	0.2
5	5.2	0.4	1.6	0.2
10	6.4	0.4	2.2	0.3
25	8.3	1.6	3.0	0.6
50	11.0	2.6	4.2	1.3
75	13.0	2.4	5.2	1.4
100	14.0	2.6	5.7	1.5

Table C296
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 291

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.2	0.7	0.1	0.2
5	4.2	0.4	1.6	0.2
10	5.4	0.4	2.2	0.3
25	7.7	2.4	3.0	0.6
50	11.8	3.7	4.2	1.3
75	14.5	3.3	5.2	1.4
100	15.9	3.5	5.7	1.5

Table C297
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 292

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.1	0.7	0.4	0.4
5	4.2	0.5	2.8	0.4
10	5.8	0.7	3.8	0.4
25	9.0	2.4	5.6	1.1
50	13.0	3.4	7.6	1.7
75	15.5	3.0	8.7	1.6
100	16.8	3.1	9.3	1.7

Table C298
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 293

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.7	1.6	0.4	0.4
5	8.4	0.7	2.8	0.4
10	10.5	0.7	3.8	0.5
25	12.7	1.1	5.5	1.1
50	14.3	1.5	7.5	1.7
75	15.4	1.5	8.7	1.6
100	15.9	1.6	9.3	1.7

Table C299
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 294

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.7	1.7	0.4	0.4
5	11.5	1.5	2.8	0.4
10	16.5	2.1	3.8	0.4
25	23.5	3.7	5.4	1.1
50	29.0	4.3	7.4	1.7
75	32.2	4.4	8.6	1.6
100	33.8	5.1	9.3	1.8

Table C300
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 295

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.5	0.4	0.4	0.3
5	2.9	0.4	2.6	0.3
10	4.3	0.7	3.6	0.5
25	8.0	3.1	5.3	1.1
50	12.9	4.4	7.2	1.6
75	16.2	4.0	8.4	1.6
100	17.9	4.2	9.0	1.8

Table C301
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 296

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.0	0.4	0.3
5	6.1	0.5	2.7	0.3
10	8.2	1.0	3.8	0.5
25	12.1	2.2	5.6	1.0
50	15.6	2.6	7.2	1.4
75	17.4	2.5	8.1	1.4
100	18.3	2.8	8.6	1.5

Table C302
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 297

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	1.0	0.4	0.3
5	8.3	2.0	2.7	0.3
10	16.4	3.5	3.8	0.6
25	23.9	2.8	5.6	1.0
50	27.0	2.6	7.2	1.4
75	29.0	2.7	8.1	1.4
100	30.0	3.3	8.6	1.6

Table C303
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 298

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	8.9	4.5	0.4	0.3
5	16.5	0.4	2.5	0.3
10	17.6	0.5	3.5	0.4
25	19.5	1.1	5.0	1.0
50	21.5	1.7	6.9	1.6
75	22.7	1.7	8.0	1.6
100	23.2	1.8	8.6	1.7

Table C304
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 298a

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.3	2.4	0.4	0.3
5	13.4	1.0	2.5	0.3
10	16.1	0.8	3.4	0.4
25	18.5	1.2	4.9	1.1
50	20.4	1.6	6.8	1.7
75	21.6	1.6	8.0	1.6
100	22.2	1.7	8.6	1.8

Table C305
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 299

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.8	0.4	0.3
5	4.5	0.4	2.4	0.3
10	5.8	0.7	3.4	0.4
25	8.9	2.4	4.9	1.0
50	12.8	3.6	6.8	1.7
75	15.5	3.3	8.0	1.7
100	16.8	3.6	8.6	1.8

Table C306
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 300

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.4	0.7	0.4	0.3
5	4.1	0.4	2.4	0.3
10	5.3	0.5	3.3	0.4
25	7.6	1.8	4.8	1.1
50	10.7	2.8	6.8	1.8
75	12.7	2.6	8.0	1.7
100	13.7	2.8	8.7	1.9

Table C307
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 301

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.4	1.3	0.4	0.4
5	6.1	0.2	2.4	0.3
10	6.9	0.3	3.3	0.4
25	7.5	0.2	4.8	1.1
50	7.9	0.4	6.8	1.8
75	8.2	0.6	8.0	1.7
100	8.4	0.8	8.7	1.9

Table C308
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 302

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	0.5	0.4	0.3	0.3
5	2.6	0.3	2.4	0.3
10	3.4	0.4	3.3	0.4
25	4.9	1.0	4.9	1.1
50	6.7	1.7	6.9	1.9
75	8.0	1.6	8.3	1.8
100	8.6	1.8	9.1	2.0

Table C309
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 303

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.4	1.3	0.5	0.4
5	7.2	0.6	2.7	0.3
10	9.7	2.1	3.6	0.4
25	23.4	9.1	5.3	1.2
50	36.4	10.1	7.4	2.0
75	44.0	10.2	8.9	1.9
100	47.9	11.6	9.7	2.1

Table C310
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 304

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.8	2.5	0.4	0.4
5	13.4	1.1	2.6	0.3
10	16.3	1.0	3.6	0.4
25	18.6	1.0	5.4	1.3
50	20.2	1.4	7.8	2.0
75	21.3	1.7	9.3	1.9
100	21.8	2.0	10.1	2.1

Table C311
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 305

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.0	1.6	0.4	0.4
5	8.2	0.6	2.6	0.3
10	10.8	1.5	3.6	0.4
25	15.3	2.3	5.4	1.3
50	18.4	2.1	7.9	2.0
75	19.9	2.0	9.3	2.0
100	20.7	2.1	10.0	2.1

Table C312
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 306

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.3	2.8	0.4	0.4
5	15.4	1.5	2.6	0.3
10	21.0	2.8	3.6	0.4
25	31.4	5.4	5.4	1.3
50	38.9	5.4	7.9	2.0
75	42.8	5.1	9.3	2.0
100	44.8	5.6	10.0	2.1

Table C313
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 307

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.5	2.2	0.4	0.3
5	11.4	0.9	2.5	0.3
10	14.4	1.2	3.3	0.4
25	17.9	1.6	5.0	1.3
50	20.0	1.8	7.4	2.2
75	21.3	1.8	9.0	2.1
100	22.0	2.1	9.9	2.3

Table C314
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 308

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.5	2.2	0.4	0.3
5	10.5	0.4	2.5	0.3
10	11.8	0.5	3.4	0.4
25	13.6	1.0	5.0	1.3
50	15.5	1.8	7.5	2.2
75	16.8	1.8	9.1	2.1
100	17.4	2.0	9.9	2.3

Table C315
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 309

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.4	2.1	0.3	0.3
5	9.8	0.6	2.4	0.3
10	12.5	1.5	3.2	0.3
25	17.3	1.9	4.8	1.3
50	19.6	2.0	7.1	1.9
75	21.1	2.3	8.5	1.8
100	21.9	2.8	9.2	1.9

Table C316
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 310

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.8	1.7	0.3	0.3
5	7.9	0.6	2.4	0.3
10	10.4	1.8	3.3	0.4
25	16.9	2.5	4.9	1.2
50	19.9	2.6	7.1	1.9
75	21.7	2.6	8.5	1.8
100	22.5	3.0	9.2	1.9

Table C317
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 311

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	2.1	0.3	0.3
5	10.7	0.8	2.4	0.3
10	13.7	1.5	3.2	0.3
25	19.1	2.5	4.9	1.3
50	22.7	2.9	7.2	1.9
75	24.9	2.7	8.5	1.8
100	26.0	2.9	9.2	1.9

Table C318
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 312

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.4	0.2	0.2
5	9.1	1.0	2.4	0.4
10	12.7	1.6	3.6	0.5
25	17.3	2.0	5.6	1.3
50	19.9	2.1	7.8	1.9
75	21.3	1.8	9.2	1.8
100	22.0	1.9	9.9	1.9

Table C319
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 313

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.2	0.2	0.2
5	7.1	0.7	2.4	0.4
10	9.1	0.8	3.5	0.5
25	11.9	1.8	5.5	1.4
50	15.1	2.9	7.8	2.2
75	17.4	2.9	9.5	2.1
100	18.5	3.2	10.3	2.3

Table C320
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 314

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	1.0	0.2	0.2
5	5.8	0.7	2.4	0.4
10	8.1	1.0	3.5	0.5
25	11.7	2.3	5.5	1.4
50	15.2	3.3	7.9	2.2
75	17.8	3.2	9.5	2.0
100	19.1	3.5	10.3	2.2

Table C321
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 315

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.4	0.2	0.2
5	8.7	0.9	2.4	0.4
10	12.0	1.5	3.5	0.5
25	16.5	2.3	5.6	1.3
50	19.9	3.0	8.0	2.2
75	22.1	3.0	9.5	2.0
100	23.3	3.3	10.3	2.2

Table C322
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 316

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.4	0.2	0.2
5	8.6	0.9	2.4	0.4
10	11.8	1.5	3.5	0.5
25	15.9	1.5	5.6	1.3
50	17.7	1.7	7.8	2.0
75	19.2	2.2	9.2	1.8
100	20.0	2.8	9.9	1.9

Table C323
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 317

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.4	0.8	0.2	0.2
5	5.2	0.5	2.4	0.4
10	6.9	0.7	3.5	0.5
25	10.4	2.5	5.4	1.4
50	14.5	3.3	7.8	2.0
75	16.9	2.8	9.2	1.8
100	18.2	3.0	9.9	1.9

Table C324
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 318

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.4	0.2	0.2
5	6.9	0.5	2.4	0.4
10	8.5	0.7	3.5	0.5
25	11.4	2.1	5.5	1.3
50	14.7	2.8	7.8	2.0
75	16.8	2.4	9.2	1.8
100	17.8	2.6	9.9	1.9

Table C325
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 319

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.5	2.3	0.2	0.2
5	10.7	0.6	2.4	0.4
10	12.6	0.8	3.6	0.5
25	17.9	5.6	5.6	1.3
50	26.7	8.2	7.8	1.9
75	32.7	7.1	9.2	1.8
100	35.8	7.4	9.9	1.9

Table C326
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 320

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	2.1	0.2	0.2
5	9.8	0.5	2.4	0.4
10	11.1	0.6	3.6	0.5
25	12.9	1.3	5.4	1.4
50	15.2	2.1	7.9	2.4
75	16.8	2.1	9.7	2.3
100	17.6	2.4	10.7	2.6

Table C327
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 321

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	2.0	0.2	0.2
5	9.7	0.6	2.4	0.4
10	11.5	0.7	3.5	0.5
25	13.7	1.2	5.5	1.4
50	15.8	1.9	8.0	2.4
75	17.0	1.9	9.8	2.3
100	17.7	2.1	10.7	2.6

Table C328
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 322

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.5	2.1	0.3	0.3
5	11.4	0.9	2.6	0.3
10	14.6	1.3	3.6	0.5
25	18.7	2.4	5.2	1.2
50	22.5	3.3	7.4	2.0
75	24.9	3.1	8.8	1.9
100	26.1	3.4	9.5	2.0

Table C329
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 323

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.8	1.5	0.3	0.3
5	8.6	0.9	2.6	0.3
10	11.8	1.3	3.6	0.4
25	14.7	1.2	5.2	1.2
50	16.3	1.6	7.3	1.9
75	17.7	1.9	8.8	1.8
100	18.4	2.3	9.5	2.0

Table C330
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 324

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.9	2.2	0.3	0.3
5	12.2	1.2	2.6	0.3
10	15.7	1.3	3.6	0.4
25	19.8	2.2	5.2	1.2
50	23.2	3.0	7.3	1.9
75	25.5	2.9	8.7	1.8
100	26.7	3.2	9.5	2.0

Table C331
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 325

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.4	2.1	0.3	0.3
5	12.1	1.1	2.6	0.3
10	15.8	1.4	3.6	0.4
25	21.5	4.2	5.2	1.2
50	28.0	6.0	7.3	1.9
75	32.6	5.6	8.7	1.8
100	34.9	6.1	9.5	2.0

Table C332
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 326

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.4	2.0	0.3	0.3
5	11.6	1.0	2.6	0.3
10	14.8	1.1	3.6	0.4
25	17.6	1.2	5.2	1.2
50	19.0	1.5	7.3	1.9
75	20.3	1.7	8.8	1.8
100	20.9	2.1	9.5	2.0

Table C333
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 327

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.9	0.4	0.3
5	5.3	0.6	2.6	0.4
10	7.8	1.5	3.6	0.4
25	12.8	2.7	5.1	1.1
50	16.9	3.2	7.1	1.8
75	19.3	3.1	8.4	1.7
100	20.5	3.4	9.0	1.8

Table C334
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 328

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.6	0.9	0.4	0.4
5	4.8	0.5	2.6	0.3
10	6.6	0.9	3.6	0.4
25	10.1	2.0	5.2	1.1
50	13.3	2.5	7.2	1.8
75	15.1	2.4	8.4	1.7
100	16.0	2.6	9.0	1.8

Table C335
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 329

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.7	1.5	0.4	0.4
5	7.2	0.5	2.6	0.3
10	8.9	0.8	3.6	0.4
25	11.6	1.2	5.2	1.1
50	13.4	1.4	7.2	1.8
75	14.4	1.4	8.4	1.7
100	14.9	1.6	9.0	1.8

Table C336
Return Period, Maximum Water Level, and Water Level Standard Deviation for Profile: Tutuila 330

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.2	0.3	0.4
5	7.2	0.7	2.6	0.3
10	9.6	0.9	3.6	0.4
25	12.2	1.3	5.1	1.1
50	14.2	1.6	7.1	1.8
75	15.4	1.5	8.4	1.7
100	16.0	1.7	9.0	1.8

Table C337
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Aunuu 001

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	2.2	0.3	0.3
5	7.2	0.3	2.5	0.4
10	8.1	0.4	3.5	0.4
25	9.9	1.7	5.2	1.2
50	12.8	2.7	7.3	1.8
75	14.8	2.5	8.6	1.7
100	15.8	2.6	9.3	1.9

Table C338
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Aunuu 002

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.4	1.0	0.1	0.2
5	4.8	0.4	1.8	0.3
10	6.1	0.6	2.4	0.3
25	7.8	0.7	3.6	0.7
50	8.9	0.9	4.7	1.0
75	9.6	1.1	5.3	1.1
100	9.9	1.3	5.7	1.2

Table C339
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Aunuu 003

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.3	1.4	0.2	0.2
5	7.0	0.3	1.9	0.2
10	7.9	0.3	2.5	0.3
25	8.8	0.5	3.6	0.7
50	9.5	0.7	4.6	1.0
75	10.1	0.8	5.3	1.0
100	10.4	1.0	5.7	1.2

Table C340
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Aunuu 004

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.8	1.5	0.3	0.3
5	7.8	0.4	2.3	0.3
10	9.6	0.8	3.3	0.3
25	12.5	1.5	4.8	1.1
50	14.5	1.7	6.7	1.8
75	15.7	1.5	8.0	1.7
100	16.4	1.7	8.7	1.8

Table C341
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Aunuu 005

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.4	1.9	0.3	0.3
5	10.2	0.5	2.3	0.2
10	12.2	1.0	3.3	0.4
25	15.1	1.3	4.8	1.1
50	16.8	1.4	6.7	1.8
75	17.8	1.3	8.0	1.7
100	18.3	1.5	8.7	1.9

Table C342
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 001

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	0.9	0.5	0.4
5	7.2	1.5	3.4	0.5
10	13.7	2.5	4.6	0.4
25	19.7	2.4	5.8	0.6
50	23.0	3.1	6.7	0.7
75	25.4	2.9	7.2	0.8
100	26.6	3.3	7.5	1.0

Table C343
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 002

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.4	0.5	0.4
5	8.6	0.9	3.4	0.5
10	10.8	0.6	4.6	0.4
25	12.7	0.9	5.8	0.6
50	14.1	1.3	6.8	0.8
75	15.1	1.3	7.3	0.9
100	15.6	1.5	7.6	1.0

Table C344
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 003

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	1.0	0.5	0.4
5	6.7	0.9	3.4	0.5
10	9.1	0.9	4.6	0.4
25	11.2	0.9	5.9	0.6
50	12.7	1.2	6.7	0.7
75	13.6	1.2	7.2	0.8
100	14.0	1.4	7.5	0.9

Table C345
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 004

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.0	0.5	0.4
5	7.2	0.9	3.4	0.5
10	9.7	0.8	4.6	0.4
25	11.6	0.9	5.8	0.6
50	13.1	1.3	6.8	0.8
75	14.0	1.4	7.3	0.9
100	14.4	1.5	7.5	1.0

Table C346
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 005

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.8	0.9	0.5	0.4
5	6.7	1.0	3.4	0.5
10	9.5	0.9	4.6	0.4
25	11.9	1.1	5.9	0.6
50	13.7	1.6	6.7	0.8
75	14.9	1.6	7.3	0.9
100	15.5	1.9	7.6	1.0

Table C347
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 006

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.5	0.4	0.3
5	9.1	0.6	3.1	0.4
10	10.5	0.6	4.2	0.4
25	12.7	1.5	5.6	0.9
50	14.9	2.2	7.0	1.4
75	16.5	2.1	8.0	1.4
100	17.3	2.3	8.5	1.5

Table C348
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 007

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.1	0.4	0.3
5	7.6	0.7	3.1	0.4
10	9.5	0.8	4.2	0.4
25	12.1	1.5	5.6	0.9
50	14.1	1.9	7.0	1.4
75	15.5	1.9	8.0	1.4
100	16.2	2.1	8.5	1.5

Table C349
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 008

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.1	0.4	0.3
5	7.0	0.6	3.0	0.4
10	8.5	0.6	4.1	0.4
25	11.0	1.7	5.5	0.8
50	13.8	2.5	6.9	1.4
75	15.6	2.5	7.8	1.4
100	16.6	2.7	8.4	1.6

Table C350
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 009

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.4	0.4	0.3
5	7.9	0.5	3.0	0.4
10	9.4	0.6	4.1	0.5
25	11.3	1.2	5.4	0.8
50	13.1	1.8	6.8	1.5
75	14.2	1.7	7.8	1.4
100	14.8	1.9	8.3	1.6

Table C351
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 010

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.0	0.4	0.4
5	6.7	0.6	3.0	0.4
10	8.3	0.7	4.1	0.5
25	10.8	1.6	5.5	0.8
50	13.2	2.3	6.8	1.4
75	14.9	2.3	7.7	1.4
100	15.8	2.5	8.1	1.6

Table C352
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 011

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.1	0.4	0.4
5	7.2	0.7	2.9	0.4
10	9.1	0.9	4.0	0.5
25	12.0	1.8	5.4	0.8
50	14.6	2.5	6.8	1.4
75	16.4	2.4	7.6	1.4
100	17.3	2.7	8.1	1.6

Table C353
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 012

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.1	1.5	0.4	0.3
5	11.0	1.0	2.9	0.4
10	13.4	0.8	4.0	0.5
25	15.3	1.0	5.4	0.8
50	16.5	1.2	6.7	1.4
75	17.4	1.4	7.7	1.5
100	17.9	1.7	8.3	1.8

Table C354
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 013

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.0	1.6	0.4	0.3
5	9.5	0.7	2.9	0.4
10	11.4	0.8	4.0	0.4
25	13.6	1.1	5.4	0.8
50	15.3	1.5	6.7	1.4
75	16.4	1.6	7.8	1.5
100	16.9	1.8	8.3	1.8

Table C355
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 014

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.0	0.4	0.3
5	7.4	1.0	2.9	0.4
10	9.9	0.9	3.9	0.5
25	12.7	1.5	5.4	0.8
50	15.0	2.2	6.7	1.4
75	16.6	2.3	7.7	1.5
100	17.5	2.6	8.2	1.7

Table C356
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 015

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.4	0.4	0.3
5	8.8	0.8	2.9	0.4
10	11.0	0.9	4.0	0.4
25	14.1	1.6	5.4	0.8
50	16.5	2.3	6.6	1.1
75	18.1	2.3	7.3	1.3
100	18.8	2.6	7.7	1.4

Table C357
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 016

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.0	0.4	0.3
5	6.6	0.6	2.9	0.4
10	8.3	0.8	4.0	0.5
25	11.0	1.8	5.5	0.8
50	13.9	2.8	6.6	1.0
75	16.1	2.7	7.2	1.0
100	17.2	3.1	7.6	1.2

Table C358
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 017

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.0	0.4	0.3
5	6.6	0.6	2.9	0.4
10	8.3	0.8	4.0	0.5
25	11.0	1.8	5.5	0.8
50	13.9	2.8	6.6	1.0
75	16.1	2.8	7.2	1.0
100	17.3	3.2	7.6	1.2

Table C359
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 018

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.7	0.9	0.3	0.3
5	5.0	0.5	2.4	0.4
10	6.7	0.7	3.5	0.4
25	9.0	1.1	4.8	0.6
50	10.6	1.4	5.5	0.8
75	11.5	1.4	5.9	0.8
100	11.9	1.6	6.2	0.9

Table C360
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 019

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.4	0.3	0.3
5	7.5	0.6	2.4	0.4
10	9.2	0.6	3.4	0.4
25	10.8	0.6	4.7	0.6
50	11.6	0.7	5.5	0.8
75	12.1	0.8	5.9	0.8
100	12.3	1.0	6.1	0.9

Table C361
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 020

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.2	1.4	0.3	0.3
5	6.9	0.3	2.3	0.4
10	7.7	0.3	3.4	0.4
25	8.6	0.5	4.6	0.6
50	9.4	0.6	5.5	0.9
75	9.9	0.6	6.0	1.0
100	10.1	0.8	6.3	1.1

Table C362
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 021

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.1	1.7	0.2	0.3
5	7.8	0.2	2.4	0.4
10	8.6	0.3	3.4	0.4
25	9.4	0.3	4.6	0.6
50	9.8	0.4	5.5	0.7
75	10.2	0.6	5.9	0.8
100	10.4	0.7	6.2	0.9

Table C363
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 022

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	1.9	0.9	0.3	0.3
5	5.1	0.4	2.3	0.4
10	6.2	0.4	3.4	0.4
25	7.3	0.5	4.6	0.6
50	8.0	0.7	5.5	0.9
75	8.5	0.8	6.0	1.0
100	8.8	0.9	6.3	1.1

Table C364
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 023

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.1	1.0	0.3	0.3
5	5.5	0.4	2.4	0.4
10	6.6	0.4	3.4	0.4
25	7.6	0.5	4.6	0.6
50	8.3	0.6	5.6	0.9
75	8.9	0.8	6.2	1.0
100	9.1	0.9	6.4	1.1

Table C365
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 024

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.0	0.9	0.3	0.3
5	5.2	0.4	2.4	0.4
10	6.2	0.3	3.5	0.4
25	7.1	0.5	4.7	0.6
50	7.8	0.7	5.6	0.9
75	8.3	0.7	6.2	1.0
100	8.6	0.9	6.5	1.1

Table C366
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 025

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.2	1.0	0.3	0.3
5	5.6	0.5	2.4	0.4
10	7.1	0.6	3.5	0.4
25	9.1	1.1	4.7	0.6
50	10.9	1.8	5.6	0.7
75	12.3	1.9	6.1	0.8
100	13.0	2.2	6.3	0.8

Table C367
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 026

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.3	1.0	0.3	0.3
5	6.8	0.9	2.5	0.4
10	9.8	1.1	3.6	0.4
25	13.3	1.8	4.9	0.6
50	16.2	2.6	5.6	0.8
75	18.2	2.6	6.1	0.8
100	19.2	3.0	6.3	0.9

Table C368
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 027

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.3	1.6	0.3	0.3
5	8.9	0.7	2.5	0.4
10	11.4	1.3	3.6	0.4
25	15.5	1.8	4.8	0.6
50	18.1	2.0	5.7	0.7
75	19.5	2.1	6.1	0.8
100	20.3	2.3	6.3	0.9

Table C369
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 028

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.2	1.5	0.3	0.3
5	8.0	0.6	2.6	0.4
10	10.4	1.3	3.9	0.6
25	14.6	2.5	5.2	0.7
50	18.7	3.8	6.3	0.9
75	21.8	3.6	6.9	0.9
100	23.3	4.1	7.2	1.1

Table C370
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 029

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	2.4	1.0	0.3	0.3
5	5.9	0.5	2.6	0.4
10	7.5	0.7	3.9	0.5
25	9.6	1.1	5.3	0.7
50	11.4	1.7	6.4	0.9
75	12.8	1.7	7.1	1.0
100	13.4	1.9	7.4	1.2

Table C371
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 030

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	5.5	2.1	0.3	0.3
5	9.4	0.4	2.5	0.3
10	10.8	0.5	3.5	0.4
25	12.6	0.9	4.8	0.6
50	13.7	1.2	5.7	0.9
75	14.5	1.2	6.2	1.0
100	14.9	1.4	6.5	1.1

Table C372
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 031

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.5	1.6	0.3	0.3
5	7.2	0.3	2.5	0.3
10	7.9	0.3	3.5	0.4
25	9.2	0.9	4.9	0.7
50	10.6	1.3	5.9	0.9
75	11.6	1.4	6.6	1.0
100	12.0	1.6	6.9	1.1

Table C373
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 032

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	4.1	1.6	0.3	0.3
5	7.3	0.3	2.4	0.3
10	8.4	0.4	3.5	0.5
25	9.8	0.8	4.8	0.6
50	11.1	1.2	5.8	0.9
75	11.9	1.2	6.4	1.0
100	12.3	1.3	6.7	1.1

Table C374
Return Period, Maximum Water Levels, and Water Level Standard Deviation for Profile: Manua 033

Return Period	Maximum Water Level		Maximum Still-Water Level	
year	Level, ft	Std. Dev., ft	Level, ft	Std. Dev., ft
2	3.4	1.4	0.3	0.3
5	6.6	0.4	2.5	0.3
10	7.7	0.5	3.5	0.4
25	9.5	1.0	4.8	0.6
50	11.1	1.4	5.7	0.9
75	12.0	1.5	6.2	1.0
100	12.5	1.7	6.5	1.1

Appendix D
Wave Parameter and Water Level Tables by Storm

This appendix contains tables of wave parameters and water level components corresponding to the time of maximum water level for each storm at selected profiles on the five subject islands of American Samoa. Tables were generated for all profiles, but only every tenth table is included here to keep the published report to a manageable size. Maximum water level includes storm surge, wave ponding on the reef, and wave runup. Reported wave heights are in 33-ft (10-m) depth at the seaward edge of the reef or nearshore bottom slope. The reported wave heights and water level components correspond to peak total water level at the profile and may not be the maximum values experienced during the storm.

Explanation of each column in the tables is as follows:

Storm No. = identifying number of the storm,

Hs = significant wave height (average height of the one-third highest waves) in 33-ft (10-m) depth at time of maximum total water level,

H1 = average height of the one percent highest waves in 33-ft (10-m) depth at time of maximum total water level,

Tp = peak spectral wave period in 33-ft (10-m) depth at time of maximum total water level,

Dir. = deepwater wave direction at time of maximum total water level, in deg azimuth, coming from,

Surge = storm surge at time of maximum total water level,

Ponding = ponding over the reef at time of maximum total water level,

Setup = nearshore wave setup at time of maximum total water level,

Runup = wave runup at shore at time of maximum total water level,

Total = maximum total water during the storm relative to msl datum, including storm surge, ponding, and wave runup.

Table D1
Wave Parameters and Water Levels by Storm, Profile: Tutuila 1

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels------------ Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	10.5	17.5	9	270	0.3	2.0	1.2	4.7	7.0
20	5.2	8.7	10	270	0.1	0.7	0.9	4.2	5.1
21	5.1	8.6	7	238	0.3	0.3	0.7	2.6	3.1
28	3.3	5.5	9	252	0.1	0.0	0.7	3.2	3.3
33	6.9	11.6	10	292	0.2	1.3	1.0	4.8	6.3
49	10.4	17.4	12	324	0.2	2.3	1.4	7.0	9.5
60	2.5	4.1	4	274	0.1	0.0	0.5	1.1	1.2
64	3.9	6.5	10	241	0.1	0.1	0.8	3.6	3.8
82	2.2	3.7	9	227	0.1	0.0	0.7	3.1	3.2
96	6.0	10.1	6	302	0.2	0.5	0.7	2.2	2.8
97	2.2	3.6	5	353	0.1	0.0	0.3	1.5	1.6
127	8.8	14.7	9	306	0.3	1.6	1.1	4.6	6.6
146	1.0	1.7	3	349	0.1	0.0	0.0	0.0	0.1
179	2.3	3.9	9	245	0.1	0.0	0.7	3.1	3.2
231	6.0	10.1	8	313	0.1	0.8	0.8	3.3	4.2
274	2.6	4.3	6	317	0.1	0.0	0.6	1.8	1.9
335	5.9	9.8	10	313	0.2	0.9	0.9	4.5	5.6
352	1.5	2.5	3	0	0.1	0.0	0.0	0.0	0.1
390	7.5	12.5	8	306	0.1	1.2	0.9	3.6	5.0
393	3.0	5.0	6	238	0.2	0.0	0.6	1.9	2.1
414	3.9	6.5	8	245	0.2	0.0	0.7	2.9	3.1
500	0.9	1.5	11	40	0.2	0.0	0.2	2.3	2.5
504	6.4	10.7	9	263	0.1	1.0	0.9	4.1	5.3
510	6.8	11.3	9	317	0.3	1.1	0.9	4.2	5.6
513	1.0	1.7	10	36	0.1	0.0	0.2	2.1	2.3
525	6.0	10.1	8	346	0.2	0.8	0.8	3.4	4.3
543	8.0	13.3	13	256	0.2	1.9	1.2	6.4	8.4
562	16.6	27.7	13	310	1.7	3.1	2.2	10.7	15.4
575	1.0	1.6	3	313	0.1	0.0	0.0	0.0	0.1
586	11.4	19.0	11	302	0.4	2.4	1.4	6.6	9.4
588	5.7	9.5	8	349	0.2	0.6	0.8	3.3	4.2

Table D11
Wave Parameters and Water Levels by Storm, Profile: Tutuila 10

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	8.5	14.2	11	29	0.3	2.1	1.4	12.9	15.3
20	5.4	9.0	9	302	0.1	0.9	0.8	8.4	9.4
21	4.6	7.6	11	43	0.3	0.7	0.9	9.1	10.1
28	5.7	9.6	7	328	0.1	0.8	0.8	5.6	6.4
33	6.4	10.7	10	292	0.2	1.4	1.0	10.2	11.8
49	11.5	19.2	12	324	0.2	2.8	1.8	16.8	19.8
60	3.2	5.3	4	274	0.1	0.0	0.4	1.4	1.5
64	6.4	10.7	7	313	0.1	1.0	0.8	5.9	7.0
82	1.8	3.0	9	227	0.1	0.0	0.5	5.1	5.2
96	6.0	10.1	6	313	0.2	0.7	0.7	4.3	5.2
97	2.9	4.9	5	353	0.1	0.0	0.4	1.8	1.9
127	8.3	13.9	9	299	0.4	1.8	1.2	9.6	11.7
146	1.4	2.3	10	29	0.1	0.0	0.3	5.5	5.6
179	5.1	8.6	7	310	0.1	0.6	0.7	5.4	6.1
231	6.2	10.4	8	313	0.1	1.1	0.9	7.6	8.8
274	2.6	4.4	6	317	0.1	0.0	0.5	2.8	2.9
335	6.0	10.1	10	317	0.2	1.3	1.0	9.9	11.4
352	3.6	6.0	4	4	0.1	0.0	0.4	1.4	1.5
390	7.4	12.4	8	306	0.1	1.5	1.0	7.8	9.4
393	2.6	4.4	8	29	0.2	0.0	0.6	5.0	5.2
414	4.7	7.8	7	256	0.2	0.3	0.6	5.2	5.7
500	4.0	6.6	11	40	0.2	0.5	0.7	8.0	8.7
504	7.8	13.0	8	313	0.1	1.6	1.1	7.9	9.6
510	7.1	11.9	9	317	0.3	1.5	1.0	9.6	11.3
513	4.0	6.7	10	43	0.1	0.4	0.7	7.3	7.8
525	7.8	13.0	8	346	0.2	1.6	1.1	8.0	9.7
543	6.8	11.3	12	259	0.2	1.7	1.2	11.9	13.8
562	19.4	32.4	13	302	1.7	3.7	3.2	22.4	27.7
575	3.2	5.4	9	40	0.1	0.0	0.6	5.6	5.7
586	11.0	18.3	11	302	0.4	2.6	1.7	13.8	16.8
588	7.8	13.0	8	349	0.2	1.5	1.1	8.0	9.8

Table D21
Wave Parameters and Water Levels by Storm, Profile: Tutuila 20

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	10.4	17.4	11	7	0.4	2.8	1.4	11.4	14.5
20	5.7	9.5	8	331	0.1	1.2	0.7	5.7	6.9
21	6.4	10.7	11	43	0.3	1.8	1.0	8.6	10.6
28	4.9	8.1	7	328	0.1	0.7	0.5	4.3	5.1
33	6.6	11.0	9	342	0.2	1.6	0.8	7.3	9.1
49	11.1	18.6	12	317	0.2	3.1	1.6	13.4	16.6
60	1.3	2.2	4	277	0.1	0.0	0.3	1.0	1.1
64	5.2	8.7	7	313	0.1	0.9	0.5	4.5	5.5
82	1.6	2.6	5	108	0.1	0.0	0.3	1.5	1.6
96	5.4	9.1	6	338	0.2	0.8	0.5	3.5	4.4
97	3.2	5.4	4	353	0.1	0.0	0.3	1.1	1.2
127	7.4	12.3	8	320	0.4	1.7	0.9	6.6	8.6
146	4.0	6.6	9	47	0.1	0.5	0.5	4.5	5.1
179	4.3	7.2	7	317	0.1	0.4	0.4	3.6	4.2
231	6.0	10.0	7	320	0.1	1.1	0.6	4.9	6.1
274	2.0	3.3	6	310	0.1	0.0	0.3	1.7	1.8
335	5.4	9.0	9	338	0.2	1.2	0.7	6.2	7.6
352	3.3	5.5	4	0	0.1	0.0	0.3	1.1	1.2
390	5.3	8.8	8	302	0.1	1.0	0.6	5.3	6.5
393	3.7	6.2	8	32	0.2	0.2	0.4	3.8	4.3
414	4.3	7.2	6	295	0.2	0.3	0.4	2.8	3.2
500	4.6	7.7	12	36	0.2	1.1	0.7	7.8	9.1
504	6.3	10.6	8	313	0.1	1.4	0.7	6.1	7.7
510	6.9	11.6	8	4	0.3	1.6	0.8	6.5	8.4
513	5.7	9.5	10	47	0.1	1.4	0.8	7.0	8.6
525	7.6	12.7	8	349	0.1	1.8	0.9	6.6	8.5
543	8.4	14.0	9	346	0.2	2.1	1.0	8.2	10.5
562	15.3	25.6	13	302	1.7	3.5	2.4	16.5	21.7
575	3.9	6.5	9	40	0.1	0.5	0.5	4.5	5.1
586	11.0	18.4	10	320	0.4	2.8	1.5	9.6	12.8
588	8.1	13.5	8	349	0.2	1.9	0.9	6.6	8.7

Table D31
Wave Parameters and Water Levels by Storm, Profile: Tutuila 29a

Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
	----Wave Parameters----				-----------Water Levels------------				
18	5.4	9.0	10	346	0.4	1.3	0.8	11.4	13.1
20	5.0	8.3	7	328	0.1	0.8	0.5	8.3	9.1
21	0.4	0.7	10	32	0.3	0.0	0.1	2.3	2.6
28	3.8	6.4	7	324	0.1	0.2	0.4	5.9	6.2
33	5.1	8.5	8	346	0.2	0.9	0.6	9.6	10.8
49	8.9	14.8	12	317	0.1	2.6	1.3	19.1	21.9
60	0.6	1.0	4	277	0.1	0.0	0.1	1.2	1.3
64	4.1	6.8	7	313	0.1	0.3	0.4	6.5	6.9
82	0.5	0.9	4	274	0.1	0.0	0.1	1.2	1.3
96	4.3	7.2	6	324	0.2	0.2	0.4	5.3	5.7
97	0.5	0.9	4	11	0.1	0.0	0.1	1.2	1.3
127	5.6	9.4	8	320	0.4	1.1	0.7	10.1	11.5
146	1.1	1.9	9	331	0.1	0.0	0.3	5.9	6.0
179	3.3	5.5	7	317	0.1	0.0	0.4	4.9	5.1
231	4.7	7.9	7	324	0.1	0.6	0.5	7.9	8.6
274	1.6	2.6	6	310	0.1	0.0	0.3	2.9	3.0
335	3.7	6.2	10	313	0.2	0.5	0.5	9.5	10.2
352	0.8	1.4	4	4	0.1	0.0	0.2	1.1	1.2
390	4.4	7.3	8	302	0.1	0.6	0.5	8.6	9.4
393	1.7	2.8	6	281	0.2	0.0	0.3	3.2	3.4
414	2.9	4.8	7	295	0.2	0.0	0.4	5.1	5.3
500	0.8	1.3	9	14	0.2	0.0	0.2	4.5	4.7
504	5.0	8.4	8	313	0.1	0.9	0.6	9.5	10.6
510	4.1	6.8	9	320	0.3	0.5	0.5	9.4	10.2
513	0.4	0.7	10	36	0.2	0.0	0.1	2.4	2.6
525	4.3	7.2	8	346	0.1	0.6	0.5	8.5	9.2
543	5.3	8.8	9	331	0.2	1.1	0.7	10.4	11.7
562	9.3	15.5	12	288	1.6	2.3	1.5	18.8	22.8
575	1.1	1.9	8	331	0.1	0.0	0.3	5.4	5.5
586	9.0	15.0	10	328	0.3	2.4	1.2	17.5	20.2
588	4.4	7.4	8	349	0.2	0.6	0.5	9.2	10.0

Table D41
Wave Parameters and Water Levels by Storm, Profile: Tutuila 39

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	9.8	16.4	10	47	0.4	2.5	1.3	4.7	7.6
20	3.8	6.4	7	346	0.1	0.2	0.4	1.2	1.5
21	7.5	12.5	10	43	0.3	2.0	1.0	5.0	7.3
28	1.9	3.1	7	328	0.1	0.0	0.3	1.1	1.2
33	6.3	10.5	7	0	0.2	1.2	0.7	1.6	3.0
49	11.3	18.8	9	47	0.1	2.8	1.4	4.6	7.5
60	1.2	2.0	3	18	0.1	0.0	0.2	0.6	0.7
64	1.4	2.4	7	320	0.1	0.0	0.3	1.1	1.2
82	1.9	3.1	5	108	0.1	0.0	0.3	0.9	1.0
96	3.2	5.3	6	346	0.2	0.0	0.3	1.1	1.3
97	2.5	4.2	4	0	0.1	0.0	0.3	0.8	0.9
127	6.5	10.8	7	11	0.4	1.3	0.7	1.6	3.3
146	4.0	6.6	9	54	0.1	0.5	0.5	1.5	2.0
179	1.2	2.0	7	317	0.1	0.0	0.3	1.1	1.2
231	2.2	3.7	7	324	0.1	0.0	0.3	1.1	1.3
274	1.1	1.8	5	320	0.1	0.0	0.3	0.9	1.0
335	5.1	8.5	7	47	0.2	0.8	0.6	1.5	2.5
352	2.3	3.9	4	4	0.1	0.0	0.3	0.8	0.9
390	1.8	3.0	7	320	0.1	0.0	0.3	1.1	1.3
393	3.7	6.1	7	40	0.2	0.1	0.4	1.2	1.5
414	2.2	3.7	8	61	0.2	0.0	0.3	1.2	1.4
500	5.6	9.4	11	40	0.2	1.5	0.8	2.0	3.6
504	1.9	3.1	8	317	0.1	0.0	0.3	1.2	1.4
510	7.4	12.4	7	58	0.3	1.6	0.8	2.0	3.8
513	6.0	10.0	10	43	0.2	1.5	0.8	1.9	3.6
525	5.6	9.3	7	356	0.1	1.0	0.6	1.5	2.6
543	6.3	10.5	8	25	0.2	1.4	0.7	1.8	3.3
562	15.3	25.5	11	4	1.4	3.4	2.2	8.3	13.1
575	4.6	7.6	9	36	0.1	0.8	0.6	1.6	2.5
586	9.0	15.1	9	4	0.3	2.3	1.1	3.5	6.1
588	6.6	11.1	7	7	0.2	1.3	0.7	1.6	3.2

Table D51

Wave Parameters and Water Levels by Storm, Profile: Tutuila 49

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	9.6	16.0	11	4	0.4	2.6	1.4	10.0	13.0
20	5.1	8.6	8	328	0.1	1.0	0.6	6.8	7.9
21	6.2	10.4	11	43	0.3	1.7	0.9	10.0	12.0
28	4.6	7.7	7	328	0.1	0.6	0.5	5.5	6.2
33	8.3	13.8	8	346	0.2	2.0	1.0	10.0	12.2
49	9.0	15.1	12	317	0.1	2.6	1.3	10.0	12.7
60	0.9	1.5	4	281	0.1	0.0	0.2	1.2	1.3
64	5.0	8.3	7	313	0.1	0.8	0.5	5.8	6.6
82	1.4	2.4	5	112	0.1	0.0	0.3	2.1	2.2
96	5.6	9.3	6	331	0.2	0.8	0.5	4.8	5.8
97	3.3	5.5	4	356	0.1	0.0	0.3	1.3	1.4
127	7.8	13.1	8	313	0.4	1.8	0.9	10.0	12.2
146	3.7	6.2	9	47	0.1	0.4	0.4	5.9	6.4
179	4.2	7.0	7	320	0.1	0.4	0.4	5.1	5.6
231	6.0	10.0	7	320	0.1	1.1	0.6	6.3	7.6
274	1.9	3.2	6	306	0.1	0.0	0.3	2.8	2.9
335	5.3	8.9	9	346	0.2	1.1	0.7	7.9	9.3
352	3.3	5.5	4	7	0.1	0.0	0.3	1.3	1.4
390	6.0	10.1	7	313	0.1	1.2	0.6	6.3	7.6
393	3.7	6.1	8	36	0.2	0.2	0.4	5.4	5.8
414	4.3	7.1	7	299	0.2	0.4	0.5	5.3	5.8
500	5.0	8.3	12	36	0.2	1.3	0.7	10.0	11.5
504	6.3	10.6	8	317	0.1	1.4	0.7	7.8	9.4
510	6.7	11.2	8	7	0.3	1.5	0.8	8.1	9.9
513	5.3	8.8	10	43	0.2	1.2	0.7	8.4	9.8
525	7.1	11.9	8	349	0.1	1.7	0.8	8.1	9.9
543	7.8	13.0	9	349	0.2	2.0	0.9	10.0	12.1
562	16.6	27.8	12	310	1.3	3.7	2.5	9.6	14.5
575	4.4	7.3	9	36	0.1	0.8	0.6	6.7	7.5
586	11.6	19.3	9	349	0.3	2.8	1.5	10.0	13.1
588	7.7	12.8	8	4	0.2	1.8	0.9	10.0	12.0

Table D61
Wave Parameters and Water Levels by Storm, Profile: Tutuila 59

Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
	----Wave Parameters----				-----------Water Levels-----------				
18	7.9	13.2	9	68	0.4	2.0	0.8	11.0	13.3
20	3.6	6.0	6	328	0.1	0.7	0.4	2.9	3.7
21	4.7	7.8	9	65	0.4	0.8	0.5	7.8	8.9
28	3.2	5.4	5	328	0.1	0.4	0.3	2.0	2.5
33	5.7	9.6	6	346	0.2	1.4	0.5	3.8	5.3
49	8.0	13.4	9	313	0.1	2.2	0.8	11.1	13.5
60	1.1	1.9	3	281	0.1	0.0	0.2	0.7	0.8
64	3.5	5.8	5	313	0.1	0.5	0.3	2.1	2.8
82	1.1	1.9	5	112	0.1	0.0	0.3	1.5	1.6
96	3.9	6.5	4	331	0.2	0.6	0.3	1.7	2.5
97	1.1	1.8	3	68	0.1	0.0	0.2	0.8	0.9
127	3.7	6.2	7	306	0.4	0.8	0.5	4.7	6.0
146	2.6	4.3	6	47	0.1	0.3	0.3	2.8	3.1
179	2.9	4.9	5	320	0.1	0.3	0.3	1.8	2.2
231	4.2	7.0	5	320	0.1	0.8	0.4	2.4	3.3
274	1.1	1.8	4	310	0.1	0.0	0.3	1.1	1.2
335	3.2	5.3	7	320	0.2	0.6	0.4	4.1	4.9
352	1.6	2.7	3	0	0.1	0.0	0.2	0.7	0.8
390	3.3	5.5	6	299	0.1	0.5	0.4	2.8	3.5
393	1.9	3.2	7	65	0.2	0.0	0.3	2.9	3.2
414	1.3	2.1	8	83	0.2	0.0	0.3	3.5	3.7
500	3.5	5.8	8	36	0.2	0.9	0.5	6.5	7.6
504	4.4	7.4	6	317	0.1	1.0	0.4	3.3	4.4
510	6.0	10.1	7	65	0.3	1.1	0.5	6.1	7.5
513	3.7	6.1	7	43	0.2	0.9	0.4	4.3	5.3
525	5.0	8.4	6	349	0.1	1.2	0.4	3.5	4.8
543	5.4	9.1	6	349	0.2	1.4	0.5	4.6	6.1
562	6.3	10.5	8	284	1.3	1.6	0.8	10.2	13.1
575	3.1	5.1	6	36	0.1	0.5	0.4	3.2	3.9
586	7.5	12.6	7	331	0.3	1.9	0.6	7.9	10.1
588	5.4	9.0	6	4	0.2	1.3	0.5	3.7	5.2

Table D71
Wave Parameters and Water Levels by Storm, Profile: Tutuila 69

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	7.8	13.1	11	4	0.4	2.2	0.8	7.6	10.1
20	4.6	7.7	8	328	0.1	0.7	0.4	6.6	7.4
21	2.5	4.2	11	43	0.4	0.0	0.4	6.7	7.1
28	4.1	6.8	7	328	0.1	0.3	0.4	5.5	5.9
33	5.3	8.8	8	349	0.2	1.0	0.5	6.9	8.2
49	10.0	16.7	13	313	0.1	2.9	0.9	8.6	11.6
60	0.8	1.4	4	277	0.1	0.0	0.2	2.9	3.0
64	4.2	7.0	7	317	0.1	0.4	0.4	5.5	6.0
82	0.8	1.3	4	295	0.1	0.0	0.2	2.9	3.0
96	5.1	8.5	6	342	0.2	0.6	0.4	5.2	6.0
97	2.3	3.8	4	356	0.1	0.0	0.3	2.7	2.8
127	4.3	7.2	9	306	0.4	0.6	0.5	7.1	8.2
146	1.3	2.1	10	32	0.1	0.0	0.3	6.2	6.2
179	3.6	6.0	7	320	0.1	0.1	0.3	5.4	5.5
231	5.1	8.5	7	324	0.1	0.8	0.4	5.9	6.8
274	1.1	1.9	6	313	0.1	0.0	0.3	5.1	5.2
335	4.9	8.2	9	346	0.2	1.0	0.5	7.0	8.1
352	1.9	3.2	4	0	0.1	0.0	0.3	2.7	2.8
390	5.0	8.3	7	313	0.1	0.8	0.4	5.8	6.7
393	1.9	3.1	8	36	0.2	0.0	0.3	5.7	6.0
414	1.5	2.5	8	22	0.2	0.0	0.3	5.7	5.9
500	2.6	4.3	12	36	0.2	0.0	0.3	6.7	6.9
504	5.4	9.1	8	317	0.1	1.1	0.5	6.9	8.2
510	4.5	7.5	9	320	0.3	0.7	0.5	7.2	8.2
513	2.5	4.1	11	32	0.2	0.0	0.3	6.5	6.6
525	5.7	9.5	8	346	0.1	1.2	0.5	6.8	8.1
543	7.1	11.9	9	349	0.2	1.8	0.6	6.4	8.3
562	19.7	32.9	11	342	1.3	3.9	1.6	9.1	14.3
575	1.2	2.0	10	18	0.1	0.0	0.3	6.2	6.3
586	9.8	16.3	10	331	0.3	2.5	0.8	7.5	10.3
588	5.3	8.9	8	4	0.2	1.0	0.5	6.9	8.2

Table D81
Wave Parameters and Water Levels by Storm, Profile: Tutuila 79

Storm No.	Wave Parameters Hs ft	H1 ft	Tp sec	Dir. deg az	Water Levels Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	8.4	14.1	11	4	0.4	2.3	1.6	16.4	19.1
20	4.5	7.5	10	270	0.1	0.9	0.8	12.3	13.3
21	4.0	6.7	11	43	0.4	0.7	0.8	12.6	13.6
28	4.7	7.9	7	328	0.1	0.6	0.7	8.6	9.3
33	4.1	6.8	10	270	0.2	0.7	0.8	11.9	12.8
49	14.2	23.7	13	313	0.1	3.7	2.7	21.6	25.4
60	3.6	6.0	4	277	0.1	0.0	0.4	2.3	2.4
64	6.0	10.0	7	313	0.1	1.1	0.9	8.9	10.1
82	0.8	1.4	5	263	0.1	0.0	0.2	2.6	2.7
96	6.1	10.2	6	310	0.2	1.0	0.8	6.7	7.9
97	3.2	5.4	4	356	0.1	0.0	0.4	2.3	2.4
127	6.9	11.5	10	306	0.4	1.8	1.2	14.3	16.4
146	2.4	4.0	9	40	0.1	0.0	0.4	7.4	7.5
179	4.7	7.9	7	317	0.1	0.6	0.7	8.6	9.3
231	6.7	11.2	7	320	0.1	1.4	1.0	9.0	10.5
274	2.4	4.0	6	306	0.1	0.0	0.4	4.6	4.7
335	5.2	8.7	10	320	0.2	1.2	1.0	13.4	14.8
352	3.2	5.4	4	7	0.1	0.0	0.4	2.2	2.3
390	6.6	11.0	8	299	0.1	1.5	1.0	10.1	11.7
393	2.9	4.8	8	25	0.2	0.0	0.5	7.9	8.1
414	6.3	10.5	7	292	0.2	1.2	0.9	8.9	10.3
500	3.4	5.7	12	36	0.2	0.5	0.6	12.2	12.9
504	7.8	13.1	8	306	0.1	1.9	1.2	10.4	12.4
510	6.0	10.1	9	324	0.3	1.4	1.0	12.3	14.0
513	3.7	6.1	10	36	0.2	0.5	0.7	10.9	11.6
525	6.9	11.5	8	349	0.1	1.6	1.1	10.2	11.9
543	6.6	11.0	13	270	0.2	2.0	1.4	18.0	20.2
562	19.6	32.8	13	284	1.2	4.1	3.6	26.6	31.9
575	3.1	5.2	9	36	0.1	0.0	0.5	8.5	8.6
586	9.3	15.5	11	306	0.3	2.5	1.7	16.1	18.9
588	6.9	11.5	8	4	0.2	1.6	1.1	10.2	12.1

Table D91
Wave Parameters and Water Levels by Storm, Profile: Tutuila 89

Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
	----Wave Parameters----				-----------Water Levels-----------				
18	9.0	15.0	10	54	0.4	2.1	1.1	12.0	14.5
20	2.0	3.4	7	342	0.1	0.1	0.5	4.9	5.0
21	10.0	16.7	9	76	0.4	2.2	1.2	10.4	13.0
28	1.0	1.7	7	328	0.1	0.0	0.3	3.6	3.7
33	2.8	4.6	8	346	0.2	0.2	0.6	6.1	6.5
49	7.8	13.0	8	43	0.1	1.7	0.9	8.8	10.6
60	0.8	1.3	5	40	0.1	0.0	0.2	2.3	2.4
64	0.7	1.2	7	317	0.1	0.0	0.2	2.9	3.0
82	1.1	1.9	9	115	0.1	0.0	0.2	5.0	5.1
96	4.7	7.8	8	349	0.2	0.6	0.6	6.9	7.7
97	2.1	3.5	4	0	0.1	0.0	0.4	2.4	2.5
127	4.1	6.9	9	302	0.4	0.6	0.7	8.1	9.2
146	3.8	6.3	9	50	0.1	0.3	0.6	6.6	6.9
179	1.3	2.2	7	58	0.1	0.0	0.3	3.8	3.9
231	1.3	2.1	7	328	0.1	0.0	0.3	3.7	3.8
274	3.4	5.6	4	40	0.1	0.0	0.4	2.5	2.6
335	5.5	9.2	7	43	0.2	0.8	0.6	6.5	7.5
352	2.0	3.4	4	7	0.1	0.0	0.4	2.4	2.5
390	1.0	1.7	7	317	0.1	0.0	0.2	3.7	3.8
393	2.8	4.7	8	32	0.2	0.0	0.5	5.8	6.1
414	5.4	9.0	8	58	0.2	0.9	0.7	7.4	8.5
500	4.9	8.1	11	40	0.2	1.0	0.8	9.4	10.6
504	1.4	2.4	7	328	0.1	0.0	0.3	4.4	4.6
510	8.0	13.4	7	112	0.3	1.5	0.9	6.8	8.6
513	5.6	9.3	10	47	0.2	1.2	0.8	9.3	10.6
525	2.4	4.0	8	349	0.1	0.2	0.5	5.7	6.0
543	3.7	6.2	8	11	0.2	0.3	0.6	6.2	6.7
562	8.9	14.8	10	22	1.2	1.9	1.2	15.0	18.1
575	3.4	5.6	9	32	0.1	0.2	0.6	6.5	6.8
586	6.2	10.3	8	11	0.3	1.1	0.7	7.9	9.3
588	5.0	8.4	8	101	0.2	0.7	0.6	6.9	7.9

Table D101
Wave Parameters and Water Levels by Storm, Profile: Tutuila 99

	----Wave Parameters----				-----------Water Levels------------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	6.8	11.3	9	61	0.4	1.3	0.9	10.0	11.7
20	0.8	1.3	5	241	0.1	0.0	0.2	4.0	4.1
21	11.7	19.5	9	133	0.4	2.5	1.3	10.0	12.9
28	1.0	1.6	6	241	0.1	0.0	0.3	5.9	6.0
33	2.2	3.7	7	205	0.2	0.0	0.5	10.0	10.2
49	4.9	8.2	8	58	0.1	0.5	0.6	10.0	10.6
60	0.9	1.5	7	158	0.1	0.0	0.2	5.7	5.8
64	1.6	2.7	7	241	0.1	0.0	0.5	10.0	10.1
82	2.3	3.8	9	191	0.1	0.0	0.5	10.0	10.1
96	6.6	11.1	8	148	0.2	1.2	0.8	10.0	11.4
97	1.4	2.4	3	86	0.1	0.0	0.2	4.8	4.9
127	5.4	9.1	8	180	0.4	0.7	0.7	10.0	11.1
146	2.4	4.0	9	50	0.1	0.1	0.5	10.0	10.1
179	1.7	2.9	7	230	0.1	0.0	0.5	10.0	10.1
231	1.3	2.2	8	180	0.1	0.0	0.3	6.6	6.7
274	1.7	2.9	4	40	0.1	0.0	0.4	6.3	6.4
335	6.7	11.2	6	144	0.2	0.9	0.7	10.0	11.2
352	1.6	2.7	4	119	0.1	0.0	0.4	6.3	6.4
390	1.6	2.7	6	238	0.1	0.0	0.4	10.0	10.1
393	5.8	9.7	6	151	0.2	0.6	0.6	10.0	10.9
414	7.7	12.9	9	162	0.2	1.7	0.9	10.0	11.8
500	8.6	14.3	8	140	0.2	1.8	0.9	10.0	12.0
504	1.6	2.7	7	248	0.1	0.0	0.5	10.0	10.1
510	7.6	12.7	7	158	0.3	1.3	0.8	10.0	11.6
513	6.9	11.6	7	148	0.2	1.2	0.7	10.0	11.3
525	1.3	2.2	10	220	0.1	0.0	0.3	10.0	10.1
543	2.5	4.1	7	40	0.2	0.1	0.5	10.0	10.2
562	7.4	12.4	11	140	1.3	1.6	1.1	10.0	12.9
575	1.9	3.1	9	36	0.1	0.0	0.5	10.0	10.1
586	3.4	5.7	7	36	0.3	0.3	0.5	10.0	10.6
588	7.4	12.3	7	126	0.2	1.3	0.8	10.0	11.5

Table D111
Wave Parameters and Water Levels by Storm, Profile: Tutuila 109

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	7.5	12.5	9	209	0.4	1.8	0.7	6.6	8.9
20	1.0	1.6	9	248	0.1	0.0	0.3	4.7	4.8
21	10.1	16.8	9	158	0.4	2.5	0.8	7.6	10.4
28	1.3	2.2	9	245	0.1	0.0	0.3	4.7	4.8
33	2.6	4.4	10	227	0.2	0.0	0.3	5.4	5.6
49	2.9	4.8	9	83	0.1	0.0	0.3	4.8	4.9
60	1.0	1.6	7	158	0.1	0.0	0.3	3.5	3.6
64	4.9	8.2	10	238	0.1	1.1	0.5	6.2	7.4
82	4.3	7.1	9	223	0.1	0.7	0.4	5.2	6.0
96	5.4	9.1	8	148	0.2	1.1	0.5	5.1	6.3
97	1.1	1.8	7	234	0.1	0.0	0.3	3.5	3.6
127	8.6	14.3	8	169	0.4	2.0	0.7	6.3	8.7
146	0.5	0.9	5	79	0.1	0.0	0.1	1.9	2.0
179	4.9	8.2	10	227	0.1	1.1	0.5	6.2	7.4
231	2.3	3.9	10	241	0.1	0.0	0.3	5.2	5.3
274	0.5	0.9	4	58	0.1	0.0	0.1	1.5	1.6
335	6.6	11.1	6	176	0.2	1.2	0.4	4.1	5.5
352	0.7	1.2	8	248	0.1	0.0	0.1	3.4	3.5
390	4.1	6.9	9	234	0.1	0.6	0.4	5.2	5.9
393	5.9	9.8	6	180	0.2	0.9	0.4	4.0	5.1
414	8.5	14.2	9	158	0.2	2.2	0.7	6.8	9.1
500	8.1	13.6	8	158	0.2	1.9	0.6	6.0	8.1
504	4.3	7.1	10	241	0.1	0.8	0.4	6.0	6.9
510	7.4	12.4	7	166	0.3	1.6	0.5	5.1	7.0
513	7.2	12.0	7	169	0.2	1.5	0.5	5.0	6.7
525	3.0	5.0	10	227	0.1	0.1	0.3	5.3	5.5
543	4.0	6.7	13	234	0.2	0.9	0.5	7.8	8.9
562	17.0	28.4	12	180	1.3	3.7	1.5	15.0	20.0
575	0.4	0.7	8	90	0.1	0.0	0.1	2.4	2.5
586	4.9	8.2	9	227	0.3	1.0	0.5	5.5	6.7
588	5.9	9.8	8	126	0.2	1.2	0.5	5.3	6.7

Table D121
Wave Parameters and Water Levels by Storm, Profile: Tutuila 118

	----Wave Parameters----				-----------Water Levels------------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	6.6	11.0	9	209	0.4	1.5	0.8	6.2	8.1
20	1.1	1.8	9	245	0.1	0.0	0.3	2.5	2.6
21	10.4	17.3	9	158	0.4	2.5	1.1	9.3	12.2
28	1.6	2.6	9	241	0.1	0.0	0.3	2.5	2.6
33	2.1	3.5	10	227	0.2	0.0	0.3	3.0	3.2
49	4.6	7.6	9	83	0.1	0.8	0.5	3.2	4.1
60	1.0	1.6	7	158	0.1	0.0	0.3	1.8	1.9
64	3.7	6.1	10	234	0.1	0.5	0.4	3.3	3.9
82	3.7	6.1	9	205	0.1	0.4	0.4	2.8	3.3
96	5.7	9.6	8	148	0.2	1.2	0.6	3.5	4.9
97	1.0	1.6	7	223	0.1	0.0	0.2	1.8	1.9
127	8.5	14.2	8	169	0.4	2.0	0.9	6.1	8.5
146	0.8	1.4	5	79	0.1	0.0	0.2	1.2	1.3
179	3.9	6.5	10	227	0.1	0.6	0.5	3.5	4.2
231	1.9	3.2	10	241	0.1	0.0	0.3	2.9	3.0
274	1.0	1.6	4	58	0.1	0.0	0.3	1.0	1.1
335	6.6	11.1	6	166	0.2	1.2	0.6	2.3	3.7
352	0.5	0.8	8	248	0.1	0.0	0.1	1.4	1.5
390	3.2	5.3	9	230	0.1	0.0	0.3	2.6	2.8
393	5.9	9.8	6	169	0.2	0.9	0.5	2.3	3.4
414	8.7	14.6	9	158	0.2	2.2	0.9	8.3	10.7
500	8.4	14.0	8	158	0.2	2.0	0.9	5.9	8.1
504	3.1	5.1	10	241	0.1	0.1	0.3	3.0	3.2
510	7.5	12.5	7	155	0.3	1.6	0.7	3.2	5.1
513	7.2	12.0	7	166	0.2	1.5	0.7	3.2	4.9
525	2.3	3.9	10	223	0.1	0.0	0.3	2.9	3.0
543	3.4	5.6	12	230	0.2	0.5	0.4	4.1	4.7
562	13.6	22.7	12	173	1.4	3.2	1.9	23.5	28.0
575	0.6	1.0	8	90	0.1	0.0	0.1	1.6	1.7
586	3.9	6.5	9	227	0.3	0.5	0.5	2.9	3.7
588	6.8	11.3	8	126	0.2	1.5	0.7	4.6	6.4

Table D131
Wave Parameters and Water Levels by Storm, Profile: Tutuila 128

	----Wave Parameters----				-----------Water Levels-----------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	7.2	12.1	9	209	0.4	1.8	0.8	4.4	6.6
20	1.7	2.8	9	245	0.1	0.0	0.3	2.4	2.5
21	8.1	13.6	9	151	0.4	2.0	0.8	4.8	7.1
28	1.5	2.5	9	245	0.1	0.0	0.3	2.3	2.4
33	2.8	4.7	10	223	0.2	0.0	0.3	2.8	3.0
49	1.9	3.2	9	86	0.1	0.0	0.3	2.4	2.5
60	1.0	1.6	8	144	0.1	0.0	0.3	2.0	2.1
64	5.0	8.3	10	238	0.1	1.1	0.6	3.4	4.7
82	4.6	7.7	9	209	0.1	0.8	0.5	2.9	3.8
96	6.0	10.1	7	212	0.2	1.1	0.5	2.7	4.0
97	1.1	1.9	7	227	0.1	0.0	0.3	1.8	1.9
127	8.1	13.5	8	169	0.4	1.9	0.8	4.0	6.2
146	0.0	0.0	0	349	0.1	0.0	0.0	0.0	0.1
179	4.6	7.6	10	230	0.1	0.9	0.5	3.4	4.4
231	2.6	4.3	10	241	0.1	0.0	0.3	2.7	2.8
274	1.3	2.1	3	216	0.1	0.0	0.2	0.7	0.8
335	6.4	10.7	6	166	0.2	1.1	0.5	2.2	3.5
352	0.7	1.2	5	248	0.1	0.0	0.1	1.0	1.1
390	4.2	7.0	9	234	0.1	0.6	0.4	2.7	3.5
393	5.9	9.8	6	194	0.2	0.9	0.5	2.1	3.3
414	8.0	13.4	9	162	0.2	2.0	0.8	4.6	6.8
500	7.4	12.3	8	166	0.2	1.7	0.7	3.7	5.6
504	3.8	6.3	10	241	0.1	0.5	0.4	3.1	3.8
510	7.1	11.9	7	176	0.3	1.5	0.6	2.9	4.7
513	6.5	10.9	7	169	0.2	1.3	0.6	2.8	4.3
525	2.8	4.7	10	223	0.1	0.0	0.3	2.7	2.8
543	4.5	7.5	13	230	0.2	1.2	0.6	5.1	6.4
562	16.0	26.7	12	169	1.4	3.6	2.0	19.2	24.1
575	1.8	3.0	4	133	0.1	0.0	0.3	0.9	1.0
586	4.6	7.6	9	223	0.3	0.8	0.5	3.0	4.0
588	6.5	10.8	7	140	0.2	1.3	0.6	2.8	4.4

Table D141
Wave Parameters and Water Levels by Storm, Profile: Tutuila 138

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	7.6	12.7	8	191	0.4	1.7	0.6	6.0	8.2
20	1.1	1.8	9	245	0.1	0.0	0.3	3.8	4.0
21	9.2	15.3	9	151	0.3	2.3	0.7	7.5	10.1
28	1.0	1.6	9	245	0.1	0.0	0.3	3.8	3.9
33	2.2	3.6	10	223	0.2	0.0	0.3	4.9	5.2
49	5.3	8.9	9	86	0.1	1.2	0.5	5.4	6.7
60	1.1	1.9	8	144	0.1	0.0	0.3	2.7	2.8
64	3.4	5.6	10	238	0.1	0.3	0.4	5.2	5.6
82	3.9	6.5	9	209	0.1	0.5	0.4	4.7	5.3
96	5.1	8.5	8	151	0.2	0.9	0.5	4.6	5.7
97	0.9	1.5	7	223	0.1	0.0	0.2	1.9	2.0
127	8.3	13.8	8	169	0.4	1.9	0.6	6.3	8.6
146	0.8	1.3	5	86	0.1	0.0	0.2	1.2	1.3
179	3.3	5.5	10	230	0.1	0.2	0.4	5.1	5.5
231	1.7	2.8	10	241	0.1	0.0	0.3	4.7	4.8
274	1.3	2.1	4	76	0.1	0.0	0.3	1.0	1.1
335	6.6	11.1	6	158	0.2	1.2	0.4	3.7	5.1
352	1.3	2.2	4	101	0.1	0.0	0.3	1.0	1.1
390	2.8	4.7	9	234	0.1	0.0	0.3	3.9	4.0
393	5.6	9.3	6	173	0.2	0.8	0.4	3.3	4.3
414	8.5	14.2	9	158	0.2	2.2	0.7	7.0	9.3
500	7.9	13.2	8	158	0.2	1.9	0.6	6.0	8.0
504	2.5	4.2	10	241	0.1	0.0	0.3	4.8	4.9
510	7.2	12.1	7	162	0.3	1.5	0.5	4.9	6.7
513	6.6	11.1	7	169	0.2	1.4	0.5	4.6	6.1
525	1.3	2.2	10	216	0.1	0.0	0.3	4.8	4.9
543	3.2	5.3	13	230	0.2	0.4	0.4	6.9	7.5
562	11.2	18.7	12	169	1.4	2.8	1.2	11.4	15.6
575	0.6	1.0	8	90	0.1	0.0	0.1	1.7	1.8
586	3.5	5.9	9	223	0.3	0.2	0.4	4.7	5.2
588	6.9	11.6	8	133	0.2	1.6	0.6	5.6	7.5

Table D151
Wave Parameters and Water Levels by Storm, Profile: Tutuila 148

	----Wave Parameters----				-----------Water Levels-----------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	7.7	12.9	8	101	0.4	1.8	0.7	5.1	7.3
20	1.1	1.9	9	245	0.1	0.0	0.3	2.5	2.6
21	9.2	15.3	9	151	0.3	2.3	0.9	7.7	10.4
28	1.0	1.7	9	245	0.1	0.0	0.3	2.5	2.6
33	2.2	3.7	10	223	0.2	0.0	0.3	2.9	3.2
49	5.7	9.5	9	86	0.1	1.3	0.6	3.6	5.1
60	1.1	1.9	8	144	0.1	0.0	0.3	2.1	2.2
64	3.5	5.8	10	238	0.1	0.4	0.4	3.1	3.6
82	4.0	6.6	9	209	0.1	0.5	0.4	2.8	3.5
96	5.1	8.5	8	151	0.2	0.9	0.5	3.0	4.1
97	1.0	1.6	7	223	0.1	0.0	0.2	1.8	1.9
127	8.3	13.9	8	169	0.4	1.9	0.8	5.5	7.9
146	0.9	1.5	5	86	0.1	0.0	0.2	1.3	1.3
179	3.4	5.7	10	230	0.1	0.3	0.4	3.1	3.5
231	1.7	2.9	10	241	0.1	0.0	0.3	2.8	3.0
274	1.6	2.7	4	76	0.1	0.0	0.3	1.0	1.0
335	6.6	11.1	6	158	0.2	1.2	0.5	2.3	3.7
352	1.5	2.5	4	101	0.1	0.0	0.3	1.0	1.1
390	3.1	5.2	9	230	0.1	0.0	0.3	2.5	2.7
393	5.6	9.3	6	173	0.2	0.8	0.4	2.2	3.2
414	8.6	14.3	9	158	0.2	2.2	0.9	7.1	9.4
500	7.9	13.2	8	158	0.2	1.9	0.7	4.9	7.0
504	2.6	4.3	10	241	0.1	0.0	0.3	2.9	3.0
510	7.2	12.1	7	162	0.3	1.5	0.6	3.1	4.9
513	6.7	11.2	7	169	0.2	1.4	0.6	3.0	4.5
525	1.6	2.7	10	220	0.1	0.0	0.3	2.9	3.0
543	3.3	5.5	13	230	0.2	0.5	0.4	4.3	5.0
562	16.3	27.2	12	191	1.4	3.6	2.0	12.6	17.6
575	0.7	1.1	8	90	0.1	0.0	0.1	1.6	1.7
586	3.6	6.0	9	223	0.3	0.3	0.4	2.8	3.4
588	6.9	11.6	8	133	0.2	1.6	0.7	4.0	5.8

Table D161
Wave Parameters and Water Levels by Storm, Profile: Tutuila 158

	----Wave Parameters----				-----------Water Levels-----------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	7.8	13.1	8	191	0.4	1.8	0.7	3.8	6.0
20	1.6	2.7	9	241	0.1	0.0	0.3	2.5	2.6
21	9.1	15.2	9	151	0.3	2.3	0.9	4.8	7.4
28	1.1	1.9	9	245	0.1	0.0	0.3	2.4	2.5
33	2.3	3.9	10	223	0.2	0.0	0.3	2.9	3.1
49	5.6	9.3	9	83	0.1	1.3	0.6	3.3	4.7
60	1.1	1.9	8	144	0.1	0.0	0.3	2.1	2.2
64	3.8	6.4	10	238	0.1	0.6	0.4	3.2	3.8
82	4.1	6.9	9	209	0.1	0.6	0.4	2.8	3.5
96	5.0	8.4	8	151	0.2	0.9	0.5	2.8	3.9
97	1.0	1.6	7	223	0.1	0.0	0.3	1.8	1.9
127	8.4	14.0	8	169	0.4	2.0	0.7	3.9	6.3
146	0.9	1.5	5	86	0.1	0.0	0.2	1.3	1.3
179	3.7	6.1	10	230	0.1	0.5	0.4	3.1	3.7
231	1.9	3.2	10	241	0.1	0.0	0.3	2.8	2.9
274	1.7	2.9	4	76	0.1	0.0	0.3	1.0	1.0
335	6.6	11.1	6	158	0.2	1.2	0.5	2.2	3.6
352	1.6	2.6	4	101	0.1	0.0	0.3	1.0	1.1
390	3.4	5.6	9	230	0.1	0.2	0.4	2.6	2.8
393	5.7	9.5	6	194	0.2	0.8	0.4	2.1	3.2
414	8.3	13.9	9	158	0.2	2.1	0.8	4.4	6.7
500	7.8	13.1	8	158	0.2	1.9	0.7	3.7	5.8
504	2.8	4.7	10	241	0.1	0.0	0.3	2.8	2.9
510	7.2	12.1	7	162	0.3	1.5	0.6	3.0	4.8
513	6.7	11.2	7	169	0.2	1.4	0.5	2.8	4.4
525	1.4	2.4	10	216	0.1	0.0	0.3	2.8	2.9
543	3.5	5.9	13	230	0.2	0.7	0.4	4.4	5.2
562	17.3	28.9	12	176	1.4	3.7	1.9	8.9	14.0
575	0.6	1.0	8	90	0.1	0.0	0.1	1.5	1.6
586	3.8	6.4	9	223	0.3	0.4	0.4	2.8	3.5
588	6.8	11.4	8	133	0.2	1.5	0.6	3.4	5.2

Table D171
Wave Parameters and Water Levels by Storm, Profile: Tutuila 168

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	9.2	15.4	8	101	0.4	2.2	0.8	10.2	12.8
20	0.6	1.0	9	241	0.1	0.0	0.1	2.0	2.1
21	11.0	18.3	8	155	0.3	2.5	0.9	10.2	13.1
28	0.6	1.0	9	241	0.1	0.0	0.1	2.0	2.1
33	1.3	2.1	10	223	0.2	0.0	0.3	3.6	3.8
49	7.5	12.5	9	83	0.1	1.9	0.7	7.4	9.4
60	1.3	2.1	8	144	0.1	0.0	0.3	2.3	2.4
64	1.4	2.4	10	238	0.1	0.0	0.3	3.4	3.5
82	2.2	3.6	10	194	0.1	0.0	0.3	3.4	3.5
96	5.5	9.2	8	151	0.2	1.1	0.5	4.2	5.4
97	0.8	1.3	7	227	0.1	0.0	0.2	1.7	1.8
127	8.5	14.2	8	169	0.4	2.0	0.8	7.6	10.0
146	0.5	0.8	6	90	0.1	0.0	0.1	1.1	1.2
179	3.1	5.2	10	230	0.1	0.1	0.3	3.6	3.8
231	0.8	1.4	10	241	0.1	0.0	0.2	3.0	3.1
274	1.1	1.8	4	76	0.1	0.0	0.3	1.0	1.1
335	1.0	1.6	9	90	0.2	0.0	0.2	2.8	3.0
352	0.8	1.3	4	101	0.1	0.0	0.2	1.0	1.1
390	1.1	1.9	9	234	0.1	0.0	0.3	2.9	3.0
393	2.9	4.9	6	173	0.2	0.0	0.3	1.8	2.1
414	8.4	14.0	9	158	0.2	2.1	0.8	10.2	12.5
500	8.4	14.1	8	158	0.2	2.0	0.7	7.0	9.2
504	1.1	1.9	10	241	0.1	0.0	0.3	3.5	3.6
510	6.3	10.5	7	144	0.3	1.2	0.5	4.0	5.5
513	5.0	8.4	8	130	0.2	0.9	0.5	3.6	4.7
525	1.2	2.0	10	223	0.1	0.0	0.3	3.5	3.6
543	3.2	5.4	13	238	0.2	0.5	0.4	6.6	7.3
562	15.9	26.5	12	169	1.5	3.5	1.8	24.0	29.0
575	0.7	1.2	8	90	0.1	0.0	0.1	1.8	1.9
586	2.3	3.9	9	223	0.3	0.0	0.4	3.2	3.5
588	7.5	12.5	8	133	0.2	1.7	0.7	6.3	8.3

Table D181
Wave Parameters and Water Levels by Storm, Profile: Tutuila 178

Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
	----Wave Parameters----				-----------Water Levels-----------				
18	9.2	15.4	8	101	0.4	2.2	0.9	5.3	7.9
20	1.4	2.3	9	245	0.1	0.0	0.3	3.6	3.7
21	10.1	16.8	9	151	0.3	2.5	1.0	6.6	9.4
28	1.9	3.2	9	245	0.1	0.0	0.3	3.6	3.7
33	2.2	3.7	10	223	0.2	0.0	0.3	4.0	4.2
49	8.0	13.3	9	83	0.1	2.0	0.8	5.7	7.9
60	1.3	2.1	8	144	0.1	0.0	0.3	3.2	3.3
64	4.7	7.9	10	238	0.1	1.0	0.5	4.6	5.8
82	2.6	4.3	10	194	0.1	0.0	0.3	3.9	4.1
96	5.7	9.5	8	140	0.2	1.2	0.6	4.1	5.5
97	0.9	1.5	7	227	0.1	0.0	0.2	2.7	2.8
127	7.2	12.1	8	169	0.4	1.6	0.7	4.9	6.9
146	0.7	1.1	5	86	0.1	0.0	0.1	1.7	1.7
179	4.6	7.7	10	230	0.1	1.0	0.5	4.6	5.7
231	2.7	4.5	10	241	0.1	0.0	0.3	4.0	4.1
274	1.1	1.9	4	76	0.1	0.0	0.3	1.7	1.8
335	1.1	1.8	9	90	0.2	0.0	0.3	3.6	3.8
352	0.8	1.4	4	101	0.1	0.0	0.2	1.5	1.6
390	3.8	6.4	9	234	0.1	0.4	0.4	3.8	4.4
393	3.6	6.0	6	227	0.2	0.0	0.3	2.6	2.9
414	9.0	15.0	9	158	0.2	2.3	0.9	6.2	8.6
500	7.8	13.1	8	155	0.2	1.9	0.7	5.0	7.0
504	3.7	6.2	10	241	0.1	0.5	0.4	4.3	4.9
510	6.6	11.1	7	130	0.3	1.3	0.6	3.9	5.5
513	5.4	9.1	8	130	0.2	1.1	0.5	4.0	5.2
525	2.6	4.3	10	227	0.1	0.0	0.3	4.0	4.1
543	4.1	6.9	13	238	0.2	1.0	0.5	6.2	7.3
562	15.3	25.6	12	169	1.4	3.5	1.9	22.8	27.7
575	0.7	1.2	8	90	0.1	0.0	0.1	2.6	2.7
586	4.3	7.2	9	223	0.3	0.7	0.5	4.0	4.9
588	8.1	13.5	8	133	0.2	1.9	0.7	5.1	7.2

Table D191
Wave Parameters and Water Levels by Storm, Profile: Tutuila 188

	----Wave Parameters----				-----------Water Levels-----------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	1.1	1.9	9	101	0.4	0.0	0.4	3.0	3.4
20	0.2	0.4	9	241	0.1	0.0	0.1	0.9	1.0
21	1.9	3.1	9	151	0.3	0.0	0.4	3.0	3.4
28	0.2	0.4	9	241	0.1	0.0	0.1	0.8	0.9
33	0.4	0.7	9	230	0.2	0.0	0.1	1.5	1.7
49	1.4	2.4	9	86	0.1	0.0	0.3	2.8	2.9
60	0.3	0.5	8	144	0.1	0.0	0.1	1.1	1.2
64	0.5	0.8	10	238	0.1	0.0	0.1	1.8	1.9
82	0.6	1.0	9	209	0.1	0.0	0.1	1.9	2.0
96	0.8	1.4	9	133	0.2	0.0	0.2	2.4	2.6
97	0.2	0.3	6	230	0.1	0.0	0.0	0.6	0.7
127	1.6	2.7	8	169	0.4	0.0	0.4	2.5	2.9
146	0.1	0.2	5	86	0.1	0.0	0.0	0.5	0.5
179	0.7	1.2	10	230	0.1	0.0	0.1	2.4	2.5
231	0.3	0.5	8	180	0.1	0.0	0.1	1.2	1.3
274	0.2	0.3	4	76	0.1	0.0	0.0	0.5	0.6
335	1.2	2.0	6	158	0.2	0.0	0.3	1.8	2.0
352	0.2	0.3	4	119	0.1	0.0	0.0	0.5	0.6
390	0.4	0.7	9	234	0.1	0.0	0.1	1.4	1.6
393	1.0	1.6	6	173	0.2	0.0	0.2	1.7	1.9
414	1.6	2.7	9	158	0.2	0.0	0.3	2.8	3.0
500	1.6	2.7	8	155	0.2	0.0	0.3	2.3	2.5
504	0.5	0.8	9	180	0.1	0.0	0.1	1.8	1.9
510	1.4	2.3	7	130	0.3	0.0	0.4	2.1	2.4
513	1.0	1.7	8	130	0.2	0.0	0.3	2.3	2.5
525	0.7	1.2	6	137	0.1	0.0	0.1	1.4	1.5
543	0.7	1.1	12	230	0.2	0.0	0.1	2.4	2.5
562	4.3	7.1	12	176	1.5	0.7	0.8	6.7	8.8
575	0.4	0.7	4	155	0.1	0.0	0.1	0.7	0.8
586	0.6	1.0	9	223	0.3	0.0	0.1	2.0	2.3
588	1.2	2.0	9	104	0.2	0.0	0.3	2.9	3.2

Table D201
Wave Parameters and Water Levels by Storm, Profile: Tutuila 198

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	1.7	2.9	8	101	0.4	0.0	0.3	3.5	3.8
20	0.3	0.5	9	241	0.1	0.0	0.1	1.2	1.3
21	1.9	3.1	8	144	0.3	0.0	0.4	3.6	3.9
28	0.3	0.5	9	241	0.1	0.0	0.1	1.2	1.2
33	0.5	0.8	7	169	0.2	0.0	0.1	1.6	1.8
49	1.6	2.7	9	83	0.1	0.0	0.3	3.6	3.7
60	0.2	0.4	7	148	0.1	0.0	0.1	1.0	1.1
64	0.7	1.2	10	238	0.1	0.0	0.1	2.6	2.7
82	0.5	0.8	9	223	0.1	0.0	0.1	1.9	2.0
96	1.0	1.6	8	140	0.2	0.0	0.2	2.5	2.6
97	0.2	0.3	6	230	0.1	0.0	0.0	0.8	0.9
127	1.3	2.1	8	169	0.4	0.0	0.2	2.9	3.3
146	0.2	0.3	4	79	0.1	0.0	0.0	0.5	0.6
179	0.7	1.2	10	230	0.1	0.0	0.1	2.5	2.7
231	0.4	0.7	10	241	0.1	0.0	0.1	1.7	1.8
274	0.2	0.4	4	76	0.1	0.0	0.1	0.6	0.7
335	1.4	2.4	6	158	0.2	0.0	0.3	2.3	2.6
352	0.2	0.4	4	119	0.1	0.0	0.1	0.6	0.8
390	0.5	0.9	9	234	0.1	0.0	0.1	2.1	2.2
393	1.1	1.8	6	173	0.2	0.0	0.2	2.0	2.3
414	1.4	2.3	9	158	0.2	0.0	0.3	3.3	3.5
500	1.3	2.2	8	158	0.2	0.0	0.3	2.9	3.1
504	0.5	0.9	10	241	0.1	0.0	0.1	2.2	2.3
510	1.4	2.4	7	144	0.3	0.0	0.3	2.8	3.1
513	1.3	2.1	7	151	0.2	0.0	0.2	2.5	2.7
525	0.8	1.4	6	137	0.1	0.0	0.2	1.8	1.9
543	0.6	1.0	11	230	0.2	0.0	0.1	2.5	2.6
562	2.3	3.8	12	169	1.5	0.0	0.4	5.6	7.2
575	0.5	0.8	4	155	0.1	0.0	0.1	0.9	1.0
586	0.7	1.1	9	223	0.3	0.0	0.1	2.3	2.6
588	1.2	2.0	9	101	0.2	0.0	0.2	3.1	3.4

Table D211
Wave Parameters and Water Levels by Storm, Profile: Tutuila 208

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	0.2	0.4	8	101	0.4	0.0	0.1	2.0	2.4
20	0.1	0.1	3	0	0.1	0.0	0.0	0.0	0.1
21	0.3	0.5	8	144	0.3	0.0	0.1	2.2	2.6
28	0.0	0.0	3	328	0.1	0.0	0.0	0.0	0.1
33	0.1	0.2	5	256	0.2	0.0	0.0	0.8	1.0
49	0.2	0.4	9	86	0.1	0.0	0.1	1.8	1.9
60	0.1	0.1	3	281	0.1	0.0	0.0	0.0	0.1
64	0.1	0.2	10	241	0.1	0.0	0.0	0.8	0.9
82	0.1	0.2	5	126	0.1	0.0	0.0	0.8	0.9
96	0.1	0.2	8	151	0.2	0.0	0.0	1.0	1.2
97	0.0	0.0	3	356	0.1	0.0	0.0	0.0	0.1
127	0.2	0.4	8	169	0.4	0.0	0.1	1.8	2.2
146	0.0	0.0	3	349	0.1	0.0	0.0	0.0	0.1
179	0.1	0.2	10	230	0.1	0.0	0.0	1.0	1.1
231	0.1	0.1	10	241	0.1	0.0	0.0	0.5	0.6
274	0.0	0.0	4	241	0.1	0.0	0.0	0.0	0.1
335	0.2	0.3	6	158	0.2	0.0	0.0	1.5	1.7
352	0.1	0.1	3	4	0.1	0.0	0.0	0.0	0.1
390	0.1	0.1	6	241	0.1	0.0	0.0	0.5	0.6
393	0.2	0.3	5	148	0.2	0.0	0.0	1.2	1.5
414	0.2	0.4	9	158	0.2	0.0	0.1	2.0	2.2
500	0.2	0.4	8	155	0.2	0.0	0.1	1.8	2.0
504	0.1	0.2	9	245	0.1	0.0	0.0	0.8	0.9
510	0.2	0.3	6	126	0.3	0.0	0.0	1.5	1.8
513	0.2	0.3	7	151	0.2	0.0	0.0	1.5	1.7
525	0.1	0.2	6	137	0.1	0.0	0.0	1.0	1.1
543	0.1	0.2	11	230	0.2	0.0	0.0	0.8	0.9
562	0.3	0.5	11	173	1.5	0.0	0.1	4.3	5.8
575	0.1	0.1	4	133	0.1	0.0	0.0	0.5	0.6
586	0.1	0.2	5	32	0.3	0.0	0.0	1.1	1.4
588	0.2	0.4	7	140	0.2	0.0	0.1	1.7	2.0

Table D221
Wave Parameters and Water Levels by Storm, Profile: Tutuila 218

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	0.6	1.0	8	101	0.4	0.0	0.1	2.7	3.1
20	0.1	0.2	9	245	0.1	0.0	0.0	0.6	0.7
21	0.7	1.2	9	151	0.3	0.0	0.1	3.1	3.5
28	0.1	0.2	9	245	0.1	0.0	0.0	0.6	0.6
33	0.2	0.3	9	223	0.2	0.0	0.0	1.1	1.4
49	0.6	1.0	9	83	0.1	0.0	0.1	2.8	2.9
60	0.1	0.1	7	158	0.1	0.0	0.0	0.4	0.5
64	0.2	0.4	10	241	0.1	0.0	0.1	1.2	1.3
82	0.3	0.5	9	209	0.1	0.0	0.1	1.7	1.8
96	0.3	0.5	8	151	0.2	0.0	0.1	1.6	1.8
97	0.0	0.0	3	356	0.1	0.0	0.0	0.0	0.1
127	0.5	0.9	8	169	0.4	0.0	0.1	2.5	2.9
146	0.0	0.0	3	349	0.1	0.0	0.0	0.0	0.1
179	0.4	0.6	10	230	0.1	0.0	0.1	1.8	1.9
231	0.1	0.2	9	245	0.1	0.0	0.0	0.7	0.9
274	0.0	0.0	4	241	0.1	0.0	0.0	0.0	0.1
335	0.3	0.5	6	166	0.2	0.0	0.1	1.5	1.7
352	0.1	0.1	3	4	0.1	0.0	0.0	0.0	0.1
390	0.2	0.3	9	234	0.1	0.0	0.0	1.1	1.2
393	0.3	0.5	6	173	0.2	0.0	0.1	1.4	1.6
414	0.7	1.1	9	158	0.2	0.0	0.1	2.9	3.1
500	0.5	0.8	8	158	0.2	0.0	0.1	2.2	2.4
504	0.2	0.4	10	180	0.1	0.0	0.1	1.4	1.5
510	0.4	0.7	7	162	0.3	0.0	0.1	1.9	2.2
513	0.4	0.6	7	162	0.2	0.0	0.1	1.7	1.8
525	0.1	0.2	9	227	0.1	0.0	0.0	0.7	0.9
543	0.2	0.4	11	230	0.2	0.0	0.1	1.2	1.4
562	1.3	2.2	11	184	1.5	0.0	0.3	6.1	7.6
575	0.1	0.2	4	155	0.1	0.0	0.0	0.5	0.6
586	0.2	0.4	7	86	0.3	0.0	0.1	1.3	1.6
588	0.5	0.8	9	104	0.2	0.0	0.1	2.5	2.7

Table D231
Wave Parameters and Water Levels by Storm, Profile: Tutuila 227

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	4.3	7.1	8	191	0.4	0.5	0.5	3.1	4.0
20	0.2	0.4	9	241	0.1	0.0	0.1	0.9	1.0
21	6.3	10.6	9	151	0.3	1.5	0.8	7.5	9.4
28	0.2	0.4	9	241	0.1	0.0	0.1	0.9	1.0
33	1.0	1.6	10	223	0.2	0.0	0.2	2.8	3.1
49	1.9	3.2	9	86	0.1	0.0	0.3	2.6	2.8
60	0.7	1.2	8	144	0.1	0.0	0.1	1.7	1.8
64	1.4	2.4	8	180	0.1	0.0	0.3	2.2	2.3
82	1.9	3.2	10	194	0.1	0.0	0.3	3.0	3.1
96	2.5	4.1	9	133	0.2	0.0	0.4	2.7	2.9
97	0.2	0.4	7	212	0.1	0.0	0.1	0.9	1.0
127	4.9	8.1	8	169	0.4	0.8	0.6	3.5	4.7
146	0.1	0.2	5	86	0.1	0.0	0.0	0.5	0.5
179	2.9	4.9	10	230	0.1	0.0	0.3	3.1	3.2
231	1.1	1.8	8	180	0.1	0.0	0.3	2.2	2.3
274	0.2	0.3	4	76	0.1	0.0	0.0	0.5	0.6
335	2.8	4.7	6	158	0.2	0.0	0.3	1.8	2.1
352	0.4	0.6	4	119	0.1	0.0	0.1	0.6	0.7
390	1.1	1.8	7	212	0.1	0.0	0.3	1.9	2.0
393	2.3	3.8	6	173	0.2	0.0	0.3	1.8	2.0
414	6.1	10.2	9	162	0.2	1.4	0.8	6.7	8.4
500	4.5	7.5	8	158	0.2	0.6	0.5	3.1	4.0
504	2.1	3.5	10	180	0.1	0.0	0.3	3.0	3.1
510	3.5	5.8	7	162	0.3	0.0	0.4	2.2	2.5
513	2.3	3.8	9	140	0.2	0.0	0.3	2.7	2.8
525	1.4	2.4	6	137	0.1	0.0	0.3	1.7	1.9
543	1.3	2.1	13	241	0.2	0.0	0.3	3.7	3.8
562	12.2	20.3	12	169	1.6	2.9	1.9	20.6	25.1
575	0.9	1.5	4	155	0.1	0.0	0.2	1.0	1.1
586	1.5	2.5	9	187	0.3	0.0	0.4	2.7	3.0
588	1.0	1.6	10	220	0.2	0.0	0.2	2.8	3.1

Table D241
Wave Parameters and Water Levels by Storm, Profile: Tutuila 237

	----Wave Parameters----				-----------Water Levels-----------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	9.0	15.0	8	101	0.4	2.1	0.7	8.7	11.2
20	0.7	1.1	9	241	0.1	0.0	0.1	2.6	2.8
21	8.7	14.6	9	151	0.3	2.2	0.7	9.4	11.9
28	0.7	1.1	9	241	0.1	0.0	0.1	2.6	2.7
33	1.2	2.0	10	223	0.2	0.0	0.3	5.2	5.4
49	7.2	12.1	9	83	0.1	1.8	0.6	8.9	10.8
60	1.1	1.9	8	144	0.1	0.0	0.3	3.3	3.4
64	1.1	1.8	10	241	0.1	0.0	0.3	4.8	4.9
82	2.2	3.7	10	194	0.1	0.0	0.3	4.8	4.9
96	4.3	7.1	9	133	0.2	0.6	0.4	5.3	6.1
97	0.5	0.8	7	227	0.1	0.0	0.1	1.6	1.7
127	7.3	12.2	8	169	0.4	1.6	0.6	8.4	10.4
146	1.0	1.6	5	86	0.1	0.0	0.3	1.5	1.5
179	1.5	2.5	10	230	0.1	0.0	0.3	4.8	4.9
231	0.8	1.4	10	241	0.1	0.0	0.2	4.0	4.1
274	1.6	2.7	4	76	0.1	0.0	0.3	1.0	1.1
335	6.3	10.6	6	158	0.2	1.1	0.4	3.7	5.0
352	1.5	2.5	4	101	0.1	0.0	0.3	1.0	1.1
390	1.4	2.4	9	234	0.1	0.0	0.3	4.2	4.3
393	5.0	8.3	6	173	0.2	0.5	0.4	3.1	3.9
414	7.8	13.1	9	158	0.2	2.0	0.7	9.1	11.2
500	7.3	12.2	8	158	0.2	1.7	0.6	8.3	10.2
504	1.1	1.9	10	241	0.1	0.0	0.3	4.9	5.0
510	7.2	12.0	7	130	0.3	1.5	0.5	6.4	8.2
513	6.0	10.1	7	158	0.2	1.2	0.5	4.7	6.0
525	1.2	2.0	10	223	0.1	0.0	0.3	4.9	5.1
543	1.1	1.8	13	241	0.2	0.0	0.3	6.4	6.6
562	14.0	23.3	12	169	1.6	3.2	1.4	15.6	20.4
575	0.8	1.3	8	90	0.1	0.0	0.2	2.7	2.8
586	2.0	3.3	9	223	0.3	0.0	0.4	4.5	4.9
588	6.2	10.4	9	101	0.2	1.5	0.6	8.6	10.3

Table D251
Wave Parameters and Water Levels by Storm, Profile: Tutuila 247

	----Wave Parameters----				-----------Water Levels------------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	8.1	13.5	8	101	0.4	1.9	1.0	5.0	7.3
20	1.3	2.2	9	241	0.1	0.0	0.3	2.7	2.8
21	9.2	15.4	9	151	0.3	2.3	1.2	6.6	9.2
28	1.3	2.2	9	241	0.1	0.0	0.3	2.6	2.7
33	2.1	3.5	10	223	0.2	0.0	0.4	3.2	3.4
49	6.2	10.3	9	83	0.1	1.5	0.8	5.4	7.0
60	1.1	1.9	8	144	0.1	0.0	0.3	2.3	2.4
64	3.1	5.2	10	238	0.1	0.1	0.4	3.3	3.5
82	3.8	6.4	9	209	0.1	0.4	0.5	3.1	3.7
96	5.1	8.5	8	151	0.2	0.9	0.6	4.0	5.1
97	0.9	1.5	7	223	0.1	0.0	0.2	1.8	1.9
127	8.3	13.8	8	169	0.4	1.9	1.0	5.0	7.3
146	1.0	1.6	5	86	0.1	0.0	0.2	1.4	1.5
179	3.2	5.3	10	230	0.1	0.1	0.4	3.4	3.6
231	1.6	2.6	10	241	0.1	0.0	0.3	3.0	3.2
274	1.7	2.9	4	76	0.1	0.0	0.3	1.0	1.1
335	6.6	11.1	6	158	0.2	1.2	0.6	2.7	4.1
352	1.6	2.6	4	101	0.1	0.0	0.3	1.0	1.1
390	2.9	4.8	9	230	0.1	0.0	0.4	2.8	2.9
393	5.6	9.3	6	173	0.2	0.8	0.5	2.4	3.4
414	8.5	14.2	9	158	0.2	2.2	1.0	6.6	8.9
500	7.9	13.2	8	158	0.2	1.9	0.9	5.1	7.1
504	2.7	4.5	10	180	0.1	0.0	0.3	3.2	3.3
510	7.2	12.1	7	162	0.3	1.5	0.8	3.8	5.6
513	6.6	11.1	7	169	0.2	1.4	0.7	3.7	5.2
525	2.1	3.5	10	223	0.1	0.0	0.3	3.1	3.2
543	3.0	5.0	13	230	0.2	0.3	0.4	5.1	5.5
562	16.9	28.3	12	176	1.6	3.6	2.6	9.8	15.0
575	0.7	1.2	8	90	0.1	0.0	0.1	1.8	1.9
586	3.4	5.6	9	223	0.3	0.1	0.4	3.0	3.5
588	7.0	11.7	8	133	0.2	1.6	0.8	5.0	6.9

Table D261
Wave Parameters and Water Levels by Storm, Profile: Tutuila 257

	----Wave Parameters----				-----------Water Levels-----------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	8.9	14.8	8	101	0.4	2.1	0.7	5.7	8.2
20	1.0	1.7	7	234	0.1	0.0	0.3	2.0	2.1
21	8.9	14.8	8	155	0.3	2.1	0.7	5.6	8.1
28	0.9	1.5	8	227	0.1	0.0	0.2	2.0	2.1
33	1.1	1.9	10	227	0.2	0.0	0.3	3.8	4.0
49	7.7	12.8	9	86	0.1	2.0	0.6	5.7	7.8
60	1.1	1.8	8	144	0.1	0.0	0.3	2.3	2.4
64	1.6	2.7	10	238	0.1	0.1	0.3	3.6	3.7
82	2.4	4.0	9	209	0.1	0.2	0.3	3.2	3.5
96	4.1	6.9	9	130	0.2	0.6	0.4	3.8	4.7
97	1.0	1.6	4	90	0.1	0.0	0.2	1.1	1.2
127	6.5	10.8	8	176	0.4	1.4	0.6	4.7	6.5
146	1.0	1.7	5	86	0.1	0.0	0.3	1.4	1.5
179	1.6	2.6	9	238	0.1	0.1	0.3	3.2	3.3
231	1.0	1.6	8	234	0.1	0.0	0.2	2.4	2.5
274	1.7	2.9	4	83	0.1	0.0	0.3	1.0	1.1
335	5.9	9.8	6	162	0.2	0.9	0.4	2.6	3.8
352	1.5	2.5	4	112	0.1	0.0	0.3	1.0	1.1
390	1.5	2.5	9	234	0.1	0.0	0.3	2.9	3.0
393	4.0	6.6	6	198	0.2	0.3	0.4	2.0	2.5
414	7.2	12.0	9	162	0.2	1.8	0.6	5.5	7.5
500	7.3	12.2	7	137	0.2	1.6	0.5	4.0	5.8
504	1.2	2.0	10	241	0.1	0.0	0.3	3.6	3.7
510	6.9	11.6	7	133	0.3	1.5	0.5	4.0	5.8
513	5.7	9.6	7	155	0.2	1.1	0.5	3.4	4.7
525	1.0	1.7	10	223	0.1	0.0	0.3	3.6	3.7
543	1.6	2.6	13	234	0.2	0.1	0.3	5.0	5.3
562	14.6	24.4	13	158	1.7	3.4	1.5	12.0	17.1
575	0.7	1.1	8	90	0.1	0.0	0.1	1.8	1.8
586	1.1	1.8	10	234	0.3	0.0	0.2	3.6	3.9
588	7.0	11.7	8	133	0.2	1.6	0.6	4.8	6.8

Table D271
Wave Parameters and Water Levels by Storm, Profile: Tutuila 267

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	0.0	0.0	0	0	0.4	0.0	0.0	0.0	0.4
20	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
21	0.0	0.0	0	0	0.3	0.0	0.0	0.0	0.3
28	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
33	0.0	0.0	0	0	0.2	0.0	0.0	0.0	0.2
49	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
60	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
64	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
82	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
96	0.0	0.0	0	0	0.2	0.0	0.0	0.0	0.2
97	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
127	0.0	0.0	0	0	0.4	0.0	0.0	0.0	0.4
146	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
179	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
231	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
274	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
335	0.0	0.0	0	0	0.2	0.0	0.0	0.0	0.2
352	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
390	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
393	0.0	0.0	0	0	0.2	0.0	0.0	0.0	0.2
414	0.0	0.0	0	0	0.2	0.0	0.0	0.0	0.2
500	0.0	0.0	0	0	0.2	0.0	0.0	0.0	0.2
504	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
510	0.0	0.0	0	0	0.3	0.0	0.0	0.0	0.3
513	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
525	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
543	0.0	0.0	0	0	0.2	0.0	0.0	0.0	0.2
562	0.0	0.0	0	0	1.7	0.0	0.0	0.0	1.7
575	0.0	0.0	0	0	0.1	0.0	0.0	0.0	0.1
586	0.0	0.0	0	0	0.3	0.0	0.0	0.0	0.3
588	0.0	0.0	0	0	0.2	0.0	0.0	0.0	0.2

Table D281
Wave Parameters and Water Levels by Storm, Profile: Tutuila 276a

	----Wave Parameters----				-----------Water Levels-----------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	8.2	13.7	9	176	0.4	2.1	0.7	7.8	10.3
20	1.0	1.7	9	245	0.1	0.0	0.3	3.7	3.8
21	9.5	15.9	8	155	0.3	2.3	0.7	7.0	9.6
28	1.1	1.9	9	245	0.1	0.0	0.3	3.6	3.7
33	2.5	4.1	10	220	0.2	0.0	0.3	4.6	4.9
49	6.6	11.0	9	86	0.1	1.7	0.6	6.1	7.9
60	1.1	1.9	8	144	0.1	0.0	0.3	2.8	2.9
64	3.4	5.6	10	238	0.1	0.3	0.4	5.0	5.5
82	3.6	6.0	9	209	0.1	0.4	0.4	4.3	4.8
96	5.3	8.9	8	148	0.2	1.1	0.5	4.7	5.9
97	1.0	1.6	6	227	0.1	0.0	0.3	1.8	1.9
127	7.8	13.0	8	176	0.4	1.9	0.6	6.2	8.4
146	1.0	1.6	5	86	0.1	0.0	0.2	1.4	1.5
179	1.1	1.8	9	248	0.1	0.0	0.3	3.6	3.7
231	1.6	2.7	10	241	0.1	0.0	0.3	4.4	4.5
274	1.7	2.8	4	83	0.1	0.0	0.3	1.0	1.1
335	6.4	10.7	6	162	0.2	1.2	0.4	3.4	4.8
352	1.6	2.7	4	112	0.1	0.0	0.3	1.0	1.1
390	3.1	5.2	9	230	0.1	0.1	0.3	3.8	4.0
393	5.2	8.7	6	198	0.2	0.7	0.4	3.0	3.9
414	8.1	13.5	9	162	0.2	2.1	0.7	7.3	9.6
500	6.5	10.8	8	173	0.2	1.5	0.6	5.3	7.0
504	2.5	4.1	10	241	0.1	0.0	0.3	4.4	4.6
510	7.2	12.1	7	155	0.3	1.6	0.5	4.8	6.7
513	6.2	10.4	7	155	0.1	1.3	0.5	4.3	5.8
525	1.0	1.7	10	216	0.1	0.0	0.3	4.4	4.6
543	3.5	5.8	12	230	0.2	0.6	0.4	7.0	7.8
562	17.4	29.0	13	158	1.7	3.8	1.5	23.4	28.9
575	0.5	0.8	8	90	0.1	0.0	0.1	1.6	1.7
586	3.7	6.2	9	227	0.3	0.4	0.4	4.6	5.4
588	7.1	11.9	8	133	0.2	1.7	0.6	5.8	7.7

Table D291
Wave Parameters and Water Levels by Storm, Profile: Tutuilá 286

Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
	----Wave Parameters----				-----------Water Levels-----------				
18	9.3	15.6	8	101	0.4	0.0	1.4	5.6	6.0
20	0.8	1.4	9	241	0.1	0.0	0.2	4.0	4.1
21	9.2	15.4	8	155	0.3	0.0	1.3	5.6	5.9
28	0.9	1.5	9	241	0.1	0.0	0.2	4.2	4.3
33	1.6	2.7	10	223	0.2	0.0	0.3	6.2	6.4
49	8.6	14.4	9	86	0.1	0.0	1.3	6.1	6.2
60	1.4	2.3	8	144	0.1	0.0	0.3	4.6	4.7
64	2.0	3.4	9	230	0.1	0.0	0.4	6.1	6.2
82	2.5	4.1	9	198	0.1	0.0	0.5	5.0	5.1
96	4.0	6.6	7	194	0.2	0.0	0.6	5.0	5.2
97	0.5	0.8	7	212	0.1	0.0	0.1	2.2	2.3
127	1.6	2.7	7	227	0.4	0.0	0.3	5.0	5.4
146	1.1	1.9	5	86	0.1	0.0	0.2	2.1	2.1
179	1.8	3.0	9	234	0.1	0.0	0.3	5.0	5.1
231	1.1	1.8	10	241	0.1	0.0	0.2	5.0	5.1
274	1.9	3.2	4	83	0.1	0.0	0.3	1.8	1.9
335	6.1	10.2	6	133	0.2	0.0	0.9	5.0	5.2
352	1.6	2.7	4	112	0.1	0.0	0.3	1.6	1.7
390	1.6	2.7	8	238	0.1	0.0	0.3	5.0	5.1
393	4.6	7.7	6	187	0.2	0.0	0.7	5.0	5.2
414	7.7	12.8	9	162	0.2	0.0	1.2	5.6	5.8
500	5.3	8.9	6	130	0.2	0.0	0.8	5.0	5.2
504	1.3	2.1	9	245	0.1	0.0	0.2	5.0	5.1
510	5.5	9.2	6	108	0.3	0.0	0.8	5.0	5.3
513	5.1	8.5	6	130	0.1	0.0	0.8	5.0	5.1
525	1.0	1.7	10	220	0.1	0.0	0.2	5.0	5.1
543	1.6	2.7	12	238	0.2	0.0	0.3	6.3	6.4
562	16.4	27.4	13	158	1.7	0.0	2.6	13.1	14.7
575	0.7	1.1	8	90	0.1	0.0	0.1	2.9	3.0
586	4.3	7.2	8	94	0.4	0.0	0.7	5.0	5.4
588	6.7	11.2	9	104	0.2	0.0	1.1	5.3	5.5

Table D301
Wave Parameters and Water Levels by Storm, Profile: Tutuila 296

Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
	----Wave Parameters----				-----------Water Levels------------				
18	9.0	15.1	9	263	0.3	2.0	1.3	4.9	7.2
20	5.4	9.1	9	277	0.1	0.9	0.8	4.3	5.3
21	7.7	12.9	7	223	0.3	1.4	1.0	3.4	5.0
28	4.5	7.5	9	248	0.1	0.5	0.7	3.8	4.4
33	7.1	11.9	10	288	0.2	1.6	1.1	5.5	7.4
49	5.1	8.5	12	320	0.2	1.1	0.9	5.2	6.4
60	0.5	0.8	8	144	0.1	0.0	0.1	1.3	1.4
64	6.2	10.3	10	241	0.1	1.3	1.0	5.1	6.5
82	4.6	7.6	9	220	0.1	0.6	0.7	3.8	4.5
96	6.4	10.7	7	245	0.2	1.0	0.8	3.0	4.2
97	1.0	1.6	6	216	0.1	0.0	0.2	1.4	1.5
127	6.9	11.5	9	306	0.4	1.4	1.0	4.7	6.5
146	0.4	0.7	8	335	0.1	0.0	0.1	1.2	1.3
179	4.3	7.2	9	234	0.1	0.5	0.7	3.7	4.2
231	4.9	8.2	10	241	0.1	0.8	0.8	4.4	5.4
274	1.9	3.1	7	317	0.1	0.0	0.5	2.3	2.4
335	3.8	6.4	10	310	0.2	0.3	0.7	3.8	4.2
352	1.0	1.6	4	266	0.1	0.0	0.2	1.0	1.1
390	6.8	11.4	8	263	0.1	1.3	0.9	3.8	5.2
393	4.9	8.1	6	223	0.2	0.2	0.6	2.2	2.6
414	4.8	8.0	9	187	0.2	0.7	0.8	4.0	4.8
500	4.6	7.6	7	191	0.2	0.3	0.6	2.8	3.2
504	7.3	12.2	9	259	0.1	1.6	1.0	4.8	6.5
510	3.7	6.2	9	313	0.3	0.1	0.6	3.4	3.8
513	4.1	6.8	6	194	0.1	0.0	0.5	2.1	2.2
525	4.6	7.6	9	234	0.2	0.6	0.8	3.8	4.6
543	9.7	16.2	13	259	0.2	2.6	1.7	9.0	11.7
562	14.6	24.4	13	205	1.6	3.1	2.5	10.8	15.5
575	0.5	0.8	8	331	0.1	0.0	0.1	1.3	1.4
586	10.1	16.9	10	295	0.4	2.3	1.5	6.1	8.8
588	3.6	6.0	10	223	0.2	0.2	0.7	3.6	4.1

Table D311
Wave Parameters and Water Levels by Storm, Profile: Tutuila 305

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	9.6	16.1	9	212	0.3	2.4	1.1	9.3	12.0
20	4.1	6.8	10	270	0.1	0.7	0.5	5.7	6.5
21	8.2	13.7	7	223	0.3	1.8	0.8	5.4	7.5
28	4.3	7.1	9	248	0.1	0.7	0.5	4.8	5.6
33	5.9	9.8	10	277	0.2	1.5	0.7	7.0	8.7
49	4.0	6.7	11	274	0.2	0.8	0.5	6.5	7.4
60	0.8	1.4	8	144	0.1	0.0	0.2	2.7	2.8
64	6.1	10.2	10	238	0.1	1.6	0.8	7.1	8.8
82	4.9	8.2	9	220	0.1	1.0	0.6	5.4	6.5
96	6.2	10.4	7	245	0.2	1.2	0.6	5.0	6.4
97	1.6	2.7	6	227	0.1	0.0	0.3	2.0	2.1
127	5.9	9.8	8	241	0.4	1.2	0.6	5.8	7.3
146	0.3	0.5	7	335	0.1	0.0	0.1	1.3	1.4
179	4.4	7.4	9	234	0.1	0.8	0.5	5.0	5.9
231	4.9	8.1	10	241	0.1	1.1	0.6	5.9	7.1
274	1.4	2.4	7	317	0.1	0.0	0.3	2.4	2.5
335	2.8	4.6	10	310	0.2	0.0	0.3	4.9	5.1
352	1.0	1.6	4	320	0.1	0.0	0.3	1.0	1.1
390	6.1	10.2	8	263	0.1	1.3	0.6	5.8	7.2
393	5.0	8.4	6	216	0.2	0.6	0.4	3.4	4.2
414	6.3	10.6	9	187	0.2	1.5	0.7	6.7	8.4
500	5.6	9.4	7	184	0.2	1.0	0.5	4.7	5.8
504	6.6	11.1	9	259	0.1	1.6	0.8	6.9	8.7
510	6.3	10.5	7	180	0.3	1.2	0.6	5.1	6.6
513	1.6	2.6	9	144	0.1	0.0	0.3	4.0	4.1
525	3.9	6.5	10	227	0.2	0.6	0.5	5.6	6.3
543	8.5	14.2	13	259	0.2	2.6	1.2	13.2	15.9
562	18.1	30.2	13	205	1.7	3.8	2.6	20.0	25.5
575	0.3	0.5	8	331	0.1	0.0	0.1	1.5	1.6
586	7.8	13.0	10	295	0.4	2.0	1.0	9.4	11.8
588	3.9	6.5	10	223	0.2	0.6	0.5	5.7	6.5

Table D321
Wave Parameters and Water Levels by Storm, Profile: Tutuila 315

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels------------ Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	9.9	16.5	9	191	0.3	2.5	1.7	11.9	14.7
20	1.6	2.6	9	248	0.1	0.0	0.4	3.9	4.0
21	7.5	12.5	8	169	0.3	1.7	1.2	8.1	10.2
28	1.6	2.6	9	245	0.1	0.0	0.4	3.9	4.0
33	2.7	4.5	10	223	0.2	0.0	0.5	5.6	5.9
49	1.9	3.1	9	90	0.2	0.0	0.4	4.1	4.2
60	1.3	2.1	8	144	0.1	0.0	0.3	2.9	3.0
64	3.7	6.2	9	223	0.1	0.4	0.6	6.3	6.8
82	4.2	7.0	9	198	0.1	0.6	0.7	7.4	8.2
96	5.6	9.3	8	151	0.2	1.1	0.9	7.6	8.9
97	0.9	1.5	6	227	0.1	0.0	0.2	1.7	1.8
127	6.8	11.3	8	187	0.4	1.5	1.1	7.8	9.6
146	0.0	0.0	0	320	0.1	0.0	0.0	0.0	0.1
179	2.8	4.7	9	234	0.1	0.0	0.5	4.2	4.3
231	2.3	3.9	10	241	0.1	0.0	0.4	5.3	5.4
274	0.4	0.7	3	248	0.1	0.0	0.1	0.6	0.7
335	5.9	9.9	6	180	0.2	0.9	0.8	4.1	5.2
352	0.8	1.4	4	112	0.1	0.0	0.2	1.0	1.1
390	3.0	5.0	9	241	0.1	0.0	0.5	4.5	4.6
393	4.5	7.5	6	205	0.2	0.3	0.6	3.3	3.8
414	6.6	11.0	9	194	0.2	1.6	1.1	10.9	12.7
500	4.7	7.9	8	162	0.2	0.8	0.7	7.2	8.2
504	3.3	5.5	9	180	0.1	0.1	0.6	5.1	5.3
510	6.2	10.4	7	173	0.3	1.2	0.9	5.8	7.3
513	5.4	9.0	6	180	0.1	0.8	0.7	3.8	4.7
525	2.6	4.4	10	227	0.2	0.0	0.5	5.5	5.7
543	3.1	5.2	13	241	0.2	0.4	0.6	10.0	10.5
562	11.2	18.7	11	130	1.7	2.6	2.2	16.8	21.1
575	1.6	2.6	3	166	0.1	0.0	0.2	0.8	0.9
586	5.1	8.5	9	241	0.4	1.0	0.9	10.4	11.8
588	5.9	9.9	8	137	0.2	1.2	0.9	7.5	9.0

Table D331
Wave Parameters and Water Levels by Storm, Profile: Tutuila 325

	----Wave Parameters----				-----------Water Levels------------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	10.1	16.8	9	202	0.3	2.5	1.1	13.8	16.6
20	2.7	4.5	10	270	0.1	0.0	0.3	6.0	6.1
21	7.7	12.9	8	169	0.3	1.8	0.8	11.4	13.5
28	2.8	4.7	9	245	0.1	0.0	0.3	5.1	5.2
33	3.5	5.8	10	223	0.2	0.3	0.4	7.8	8.3
49	1.3	2.1	12	270	0.2	0.0	0.3	6.8	7.0
60	1.2	2.0	8	144	0.1	0.0	0.3	3.9	4.0
64	5.4	9.1	10	238	0.1	1.3	0.7	11.1	12.5
82	4.7	7.8	9	223	0.1	0.9	0.5	8.6	9.6
96	5.9	9.9	8	151	0.2	1.2	0.6	9.5	10.9
97	1.3	2.1	6	230	0.1	0.0	0.3	2.5	2.6
127	6.9	11.6	8	187	0.4	1.6	0.7	10.9	12.9
146	0.4	0.6	5	90	0.1	0.0	0.1	0.9	0.9
179	4.2	7.0	9	234	0.1	0.6	0.5	7.6	8.4
231	3.9	6.5	10	241	0.1	0.6	0.5	8.3	9.0
274	1.4	2.3	5	306	0.1	0.0	0.3	1.7	1.8
335	6.1	10.2	6	180	0.2	1.0	0.5	5.1	6.3
352	1.3	2.2	4	112	0.1	0.0	0.3	1.1	1.2
390	5.0	8.3	9	241	0.1	1.0	0.6	9.2	10.4
393	5.2	8.7	6	220	0.2	0.6	0.4	4.4	5.3
414	7.7	12.9	9	173	0.2	2.0	0.9	13.3	15.4
500	7.2	12.1	7	184	0.2	1.5	0.7	8.5	10.2
504	5.5	9.2	8	263	0.1	1.1	0.6	8.9	10.2
510	6.5	10.8	7	162	0.3	1.3	0.6	8.2	9.8
513	1.3	2.1	10	97	0.1	0.0	0.3	5.9	6.0
525	3.6	6.0	10	227	0.2	0.4	0.4	7.8	8.4
543	6.4	10.7	13	259	0.2	1.9	0.9	15.4	17.5
562	13.4	22.4	12	180	1.7	3.1	1.9	25.1	29.9
575	0.4	0.6	7	90	0.1	0.0	0.1	1.7	1.8
586	8.4	14.1	9	241	0.4	2.1	0.9	13.8	16.3
588	6.6	11.1	8	137	0.2	1.5	0.7	10.5	12.3

Table D341
Wave Parameters and Water Levels by Storm, Profile: Aunuu 5

Storm No.	----Wave Parameters---- Hs ft	H1 ft	Tp sec	Dir. deg az	-----------Water Levels----------- Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	7.9	13.2	11	4	0.4	1.9	1.1	11.4	13.8
20	4.6	7.6	8	328	0.1	0.4	0.6	7.9	8.4
21	3.8	6.3	11	40	0.4	0.3	0.7	9.2	9.9
28	4.0	6.7	7	328	0.1	0.0	0.5	6.9	7.1
33	7.1	11.9	8	346	0.2	1.4	0.8	8.5	10.1
49	7.5	12.6	11	331	0.1	1.9	1.1	11.0	13.0
60	1.1	1.9	5	281	0.1	0.0	0.2	4.4	4.6
64	4.5	7.5	7	317	0.1	0.2	0.5	7.0	7.4
82	3.5	5.9	4	353	0.1	0.0	0.4	3.9	4.0
96	5.2	8.7	6	346	0.2	0.4	0.6	6.0	6.6
97	3.2	5.3	4	356	0.1	0.0	0.4	3.9	4.0
127	6.9	11.6	8	328	0.4	1.3	0.8	8.5	10.2
146	1.6	2.6	10	32	0.1	0.0	0.3	8.1	8.2
179	3.8	6.3	7	320	0.1	0.0	0.5	6.9	7.0
231	5.4	9.0	7	320	0.1	0.6	0.6	7.2	7.9
274	1.4	2.4	6	306	0.1	0.0	0.3	5.7	5.8
335	4.8	8.0	9	328	0.2	0.6	0.7	8.6	9.5
352	2.9	4.8	4	4	0.1	0.0	0.4	3.9	4.0
390	5.4	9.0	7	317	0.1	0.7	0.6	7.2	7.9
393	2.7	4.5	8	18	0.2	0.0	0.5	7.5	7.7
414	1.6	2.7	8	29	0.2	0.0	0.3	7.3	7.4
500	3.1	5.2	12	29	0.2	0.0	0.6	9.4	9.7
504	5.7	9.6	8	317	0.1	0.9	0.7	8.3	9.3
510	5.0	8.4	9	324	0.3	0.8	0.7	8.8	9.8
513	3.2	5.3	11	36	0.2	0.0	0.6	8.9	9.0
525	6.1	10.2	8	349	0.1	1.1	0.7	8.3	9.5
543	6.9	11.5	9	349	0.2	1.4	0.9	9.4	11.0
562	14.9	24.8	12	310	1.3	3.1	2.0	20.0	24.4
575	3.1	5.1	9	29	0.1	0.0	0.5	7.8	7.9
586	9.6	16.1	10	328	0.3	2.2	1.2	11.4	13.9
588	6.5	10.8	8	7	0.2	1.2	0.8	8.4	9.8

Table D351
Wave Parameters and Water Levels by Storm, Profile: Manua 10

	----Wave Parameters----				-----------Water Levels------------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	7.8	13.0	9	277	0.2	1.7	1.3	5.1	7.0
20	2.2	3.7	9	245	0.1	0.0	0.6	3.2	3.3
21	6.8	11.4	10	252	0.3	1.5	1.2	6.2	8.0
28	2.2	3.7	9	245	0.1	0.0	0.6	3.2	3.2
33	5.3	8.8	6	295	0.3	0.4	0.8	2.5	3.2
49	0.4	0.7	8	292	0.1	0.0	0.1	1.4	1.4
60	1.1	1.8	7	180	0.1	0.0	0.2	1.9	2.0
64	5.5	9.2	10	238	0.1	1.1	1.0	5.5	6.7
82	4.2	7.0	10	216	0.1	0.5	0.8	4.6	5.2
96	6.1	10.2	7	306	0.3	0.9	0.9	3.4	4.5
97	1.9	3.2	7	234	0.1	0.0	0.5	2.5	2.6
127	9.2	15.3	8	230	0.6	1.8	1.4	4.9	7.3
146	0.4	0.7	8	292	0.1	0.0	0.1	1.4	1.4
179	4.7	7.9	9	230	0.1	0.7	0.9	4.5	5.2
231	3.4	5.7	10	241	0.1	0.1	0.7	3.9	4.1
274	1.0	1.6	6	288	0.1	0.0	0.2	1.6	1.6
335	4.3	7.2	7	173	0.3	0.3	0.7	3.0	3.6
352	1.6	2.6	9	245	0.1	0.0	0.3	3.0	3.0
390	4.6	7.6	9	234	0.1	0.6	0.8	4.4	5.1
393	7.6	12.7	7	223	0.6	1.3	1.1	3.8	5.7
414	8.3	13.8	9	281	0.3	1.8	1.4	5.3	7.5
500	8.0	13.3	10	176	0.7	1.7	1.4	6.4	8.8
504	6.6	11.1	11	245	0.1	1.6	1.3	6.9	8.6
510	7.5	12.6	7	220	0.4	1.3	1.1	3.8	5.5
513	7.5	12.6	9	194	0.5	1.5	1.3	5.1	7.1
525	4.0	6.6	10	227	0.1	0.4	0.8	4.4	4.8
543	4.3	7.1	13	238	0.1	0.8	0.9	5.9	6.8
562	15.4	25.8	13	252	0.4	3.5	2.8	10.8	14.7
575	4.4	7.4	5	227	0.1	0.0	0.6	1.9	2.0
586	4.3	7.1	10	241	0.1	0.5	0.8	4.6	5.3
588	1.7	2.9	6	130	0.2	0.0	0.4	2.1	2.3

Table D361
Wave Parameters and Water Levels by Storm, Profile: Manua 20

	----Wave Parameters----				-----------Water Levels-----------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	5.0	8.4	9	270	0.3	0.7	0.7	5.0	6.0
20	3.1	5.1	9	256	0.1	0.0	0.5	4.5	4.6
21	4.6	7.6	10	288	0.3	0.6	0.7	5.0	6.0
28	2.3	3.8	9	245	0.1	0.0	0.5	4.5	4.6
33	1.2	2.0	9	205	0.3	0.0	0.2	4.0	4.3
49	0.5	0.8	9	324	0.1	0.0	0.1	2.2	2.3
60	1.2	2.0	7	180	0.1	0.0	0.2	3.0	3.1
64	5.3	8.9	10	238	0.1	1.0	0.7	5.0	6.1
82	5.0	8.3	9	223	0.1	0.8	0.6	5.0	5.8
96	6.3	10.5	7	187	0.3	0.9	0.6	5.0	6.2
97	1.9	3.2	7	234	0.1	0.0	0.5	3.7	3.8
127	10.7	17.9	8	212	0.5	2.2	1.0	5.0	7.7
146	0.4	0.7	9	299	0.1	0.0	0.1	2.1	2.2
179	4.7	7.9	9	230	0.1	0.6	0.6	5.0	5.7
231	3.5	5.8	10	241	0.1	0.1	0.5	5.0	5.2
274	0.6	1.0	6	292	0.1	0.0	0.1	1.6	1.7
335	5.0	8.4	7	187	0.3	0.5	0.6	4.1	4.9
352	1.4	2.4	9	245	0.1	0.0	0.3	4.2	4.3
390	5.0	8.4	8	238	0.1	0.7	0.6	5.0	5.8
393	7.6	12.7	7	212	0.6	1.3	0.7	5.0	6.9
414	4.8	8.0	10	223	0.3	0.7	0.7	5.0	6.1
500	11.1	18.6	9	248	0.6	2.4	1.0	10.0	12.9
504	6.6	11.1	10	256	0.1	1.5	0.8	5.0	6.6
510	7.3	12.2	8	256	0.4	1.4	0.7	5.0	6.8
513	8.2	13.7	9	205	0.4	1.8	0.9	5.0	7.2
525	4.0	6.6	10	227	0.1	0.4	0.6	5.0	5.5
543	4.6	7.7	13	234	0.1	1.0	0.7	5.0	6.1
562	9.8	16.4	12	288	0.4	2.4	1.2	10.0	12.9
575	1.2	2.0	9	302	0.1	0.0	0.2	4.0	4.1
586	5.6	9.3	10	259	0.1	1.1	0.7	5.0	6.2
588	1.6	2.6	7	119	0.2	0.0	0.3	3.7	3.9

Table D371
Wave Parameters and Water Levels by Storm, Profile: Manua 30

	----Wave Parameters----				-----------Water Levels-----------				
Storm No.	Hs ft	H1 ft	Tp sec	Dir. deg az	Surge ft	Ponding ft	Setup ft	Runup ft	Total ft
18	5.2	8.7	9	277	0.3	0.8	0.7	7.4	8.5
20	3.7	6.1	9	248	0.1	0.1	0.5	7.2	7.4
21	1.6	2.6	11	180	0.3	0.0	0.3	7.9	8.2
28	2.7	4.5	9	245	0.1	0.0	0.5	7.2	7.2
33	2.8	4.7	10	270	0.3	0.0	0.6	7.6	7.9
49	1.9	3.1	12	270	0.1	0.0	0.5	8.4	8.5
60	1.2	2.0	7	180	0.1	0.0	0.2	5.7	5.8
64	5.9	9.9	10	238	0.1	1.2	0.7	7.8	9.1
82	4.7	7.9	9	227	0.1	0.7	0.6	7.3	8.1
96	7.1	11.8	7	212	0.3	1.2	0.6	6.4	7.9
97	1.7	2.8	7	230	0.1	0.0	0.5	6.4	6.5
127	9.8	16.3	9	263	0.6	2.1	0.9	8.0	10.7
146	0.5	0.8	9	302	0.1	0.0	0.1	2.7	2.8
179	4.4	7.3	10	227	0.1	0.6	0.6	7.6	8.3
231	3.9	6.5	10	241	0.1	0.3	0.6	7.6	8.0
274	0.7	1.1	5	310	0.1	0.0	0.1	2.9	2.9
335	4.9	8.2	7	166	0.3	0.4	0.5	6.4	7.2
352	1.5	2.5	8	245	0.1	0.0	0.3	6.7	6.8
390	5.5	9.2	9	238	0.1	1.0	0.7	7.4	8.5
393	7.7	12.9	7	209	0.6	1.3	0.7	6.4	8.4
414	5.9	9.8	10	227	0.3	1.2	0.8	7.8	9.4
500	12.9	21.6	9	230	0.6	2.7	1.1	8.1	11.3
504	6.5	10.8	10	252	0.1	1.4	0.8	7.9	9.5
510	6.0	10.0	8	274	0.4	1.0	0.7	7.1	8.4
513	8.0	13.3	9	180	0.4	1.7	0.8	7.9	10.0
525	3.8	6.3	10	227	0.1	0.3	0.6	7.6	7.9
543	6.6	11.1	13	263	0.1	1.8	0.9	10.6	12.5
562	13.8	23.0	13	270	0.4	3.2	1.4	9.9	13.6
575	1.1	1.8	9	310	0.1	0.0	0.2	6.0	6.2
586	5.2	8.7	10	270	0.1	0.9	0.7	7.7	8.8
588	1.3	2.1	9	270	0.2	0.0	0.2	6.6	6.8

Appendix E
Hurricane Tracks

This appendix shows hurricane tracks for each storm contained in the EST training set. Each figure consists of an upper and lower panel. The upper panel shows storm tracks through the immediate vicinity of the five islands of interest for the study. Some figures do not show a storm track in the upper panel because the storm did not pass within the bounds of the graphical limits. The lower panel shows storm tracks for the region covered by the numerical grid developed for the study. The outer boundary of the numerical grid is shown as the large circle. Storm tracks can also be seen outside of the grid region.

The date and time when each storm was first recorded in the HURDAT database is given under the label "Storm Track Start" in the lower panel. Dots in the upper and lower panels show the 6-hr HURDAT locations for the storms, lines show the 1-hr interpolated storm track. On the lower panels, the 6-hr data points are associated with a date and time given in the format mm/dd/tt where mm is the month, dd is the day, and tt is the hour referenced to GMT.

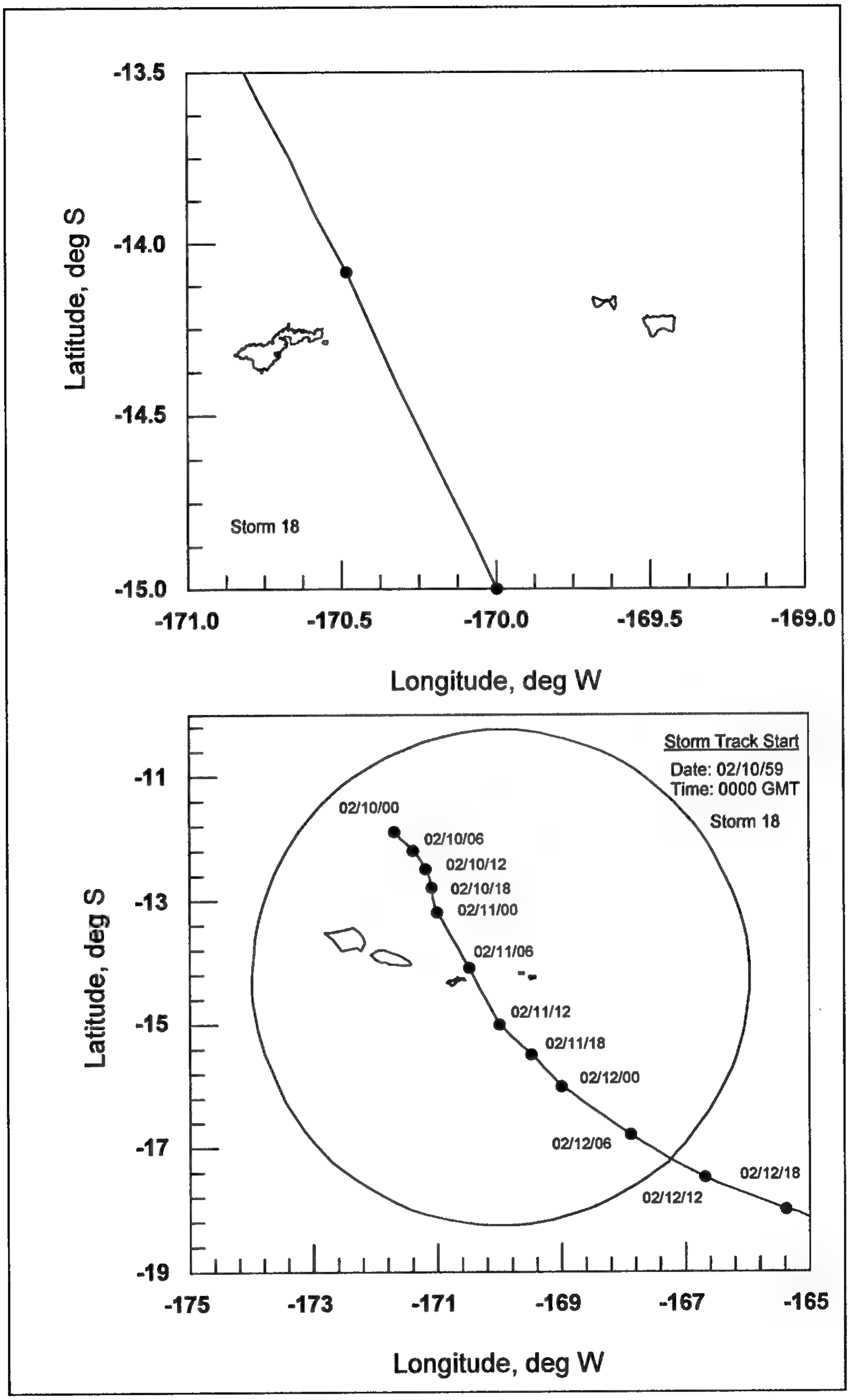


Figure E.1 Storm track for storm number 18

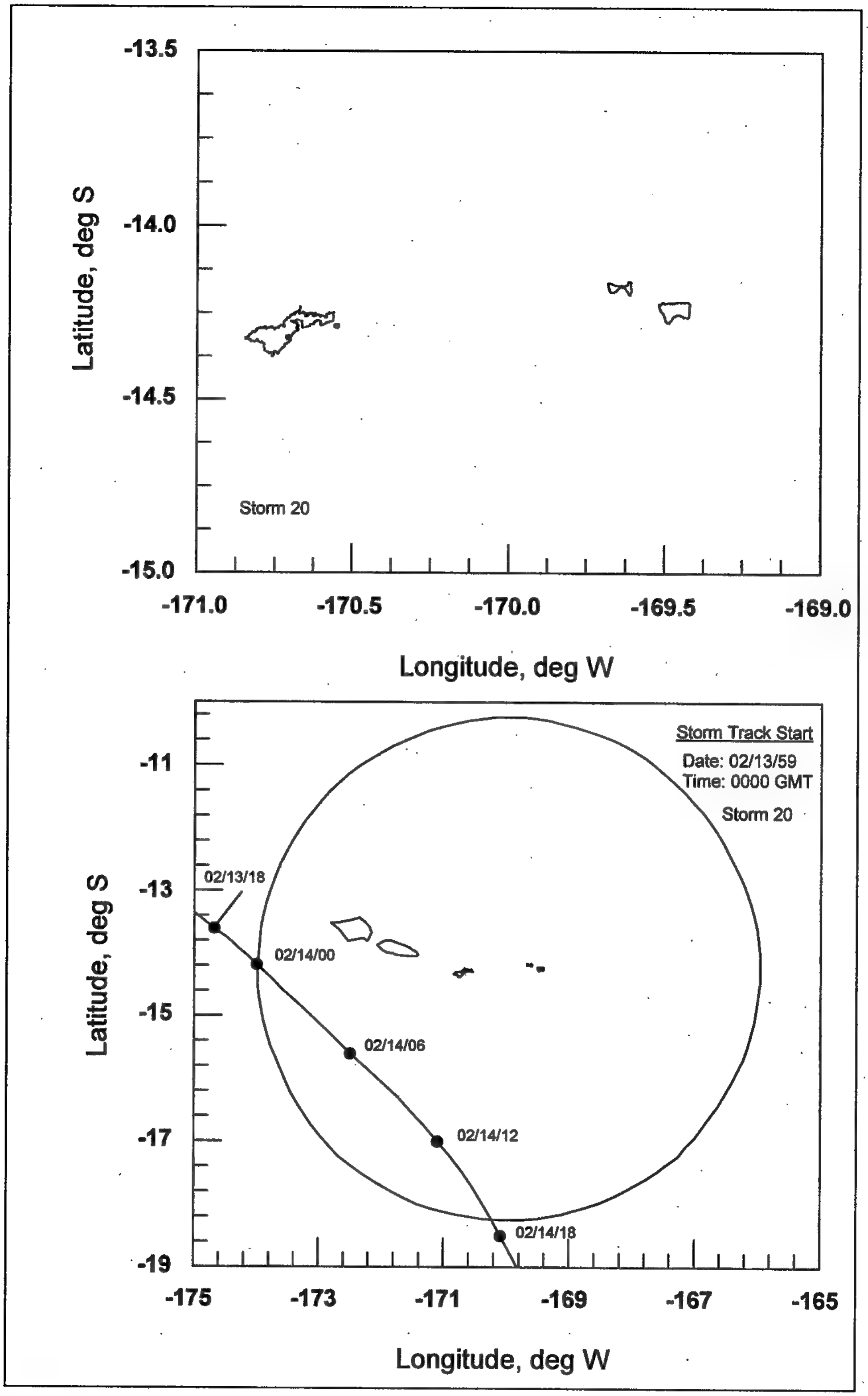


Figure E.2 Storm track for storm number 20

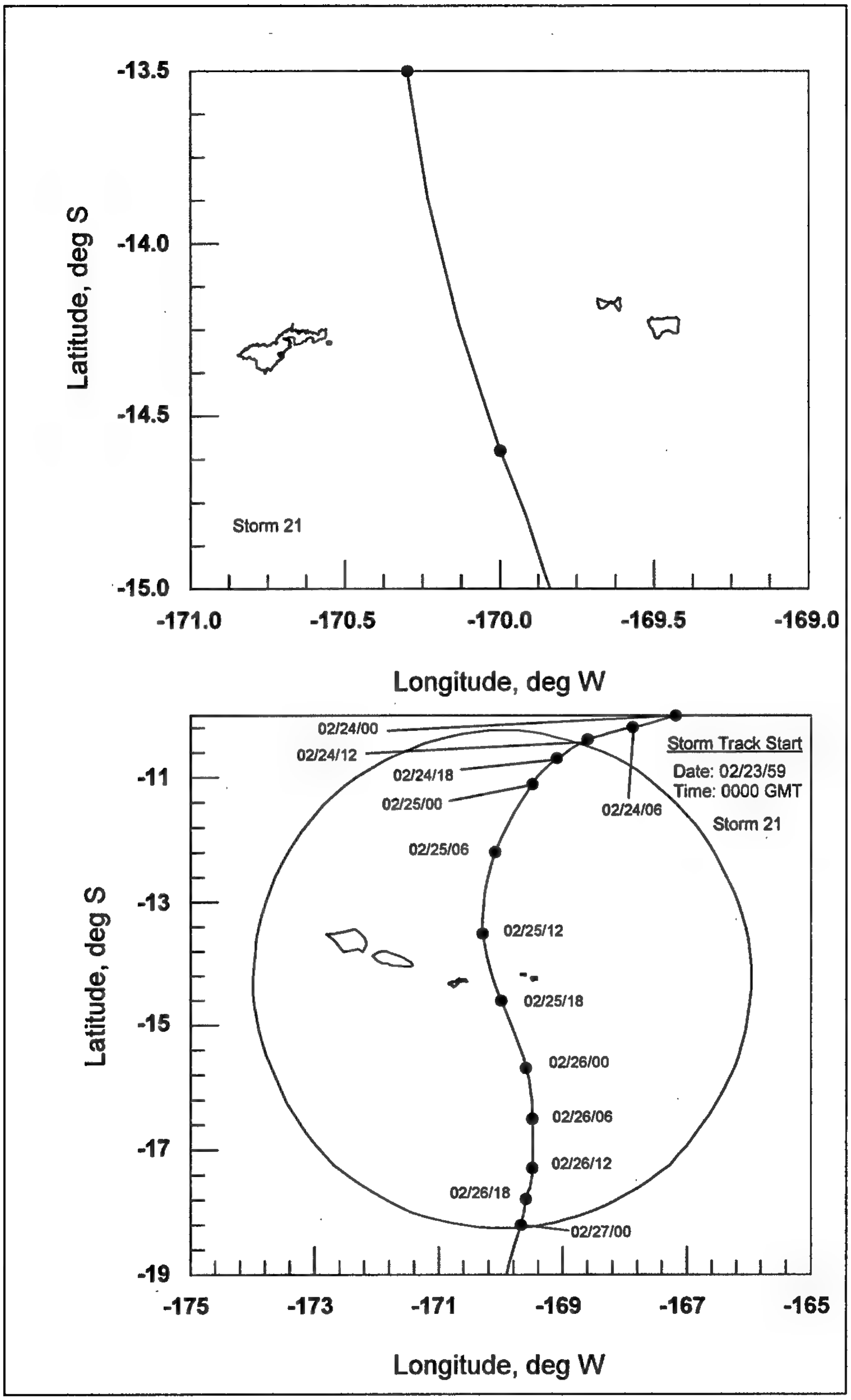
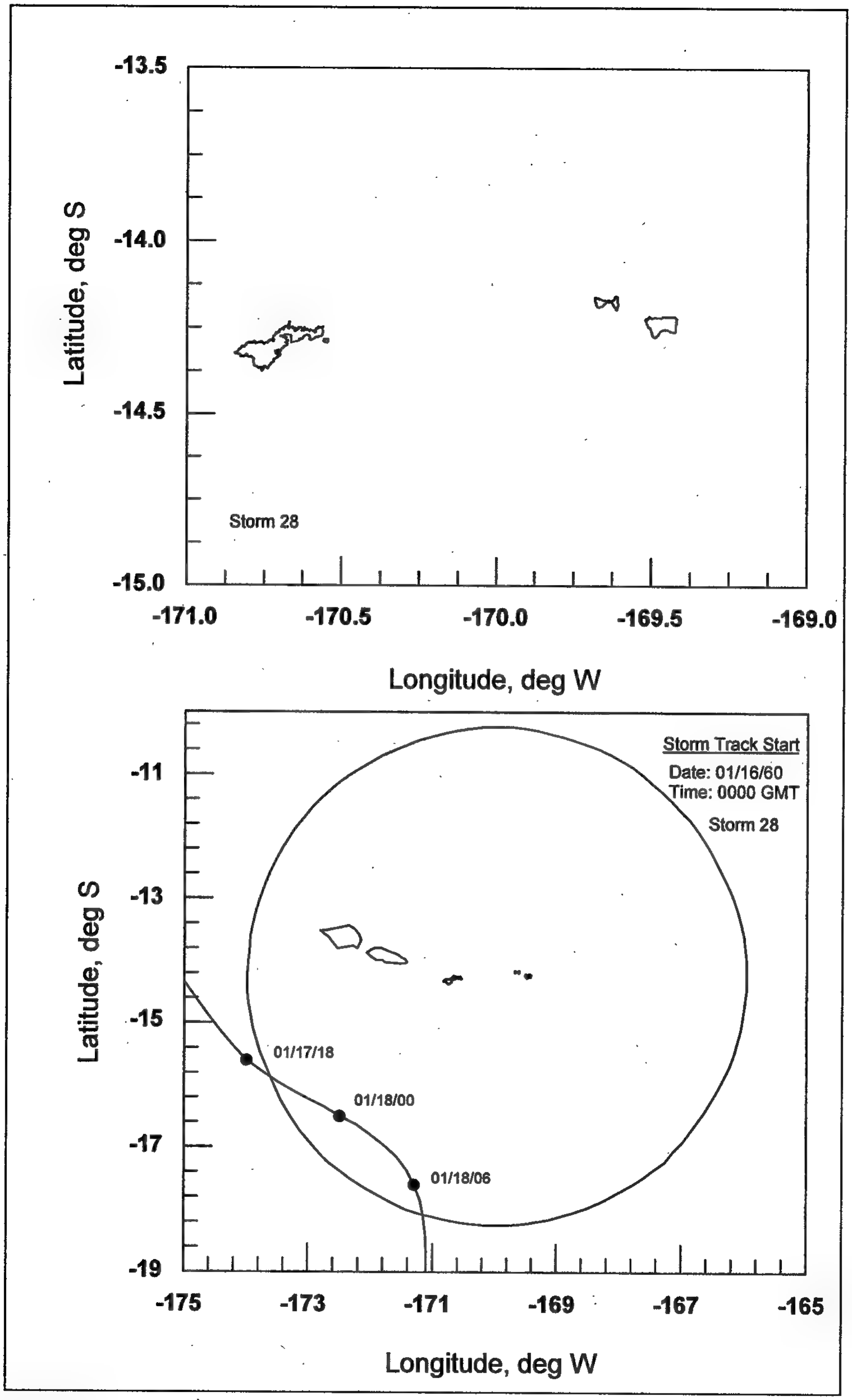


Figure E.3 Storm track for storm number 21



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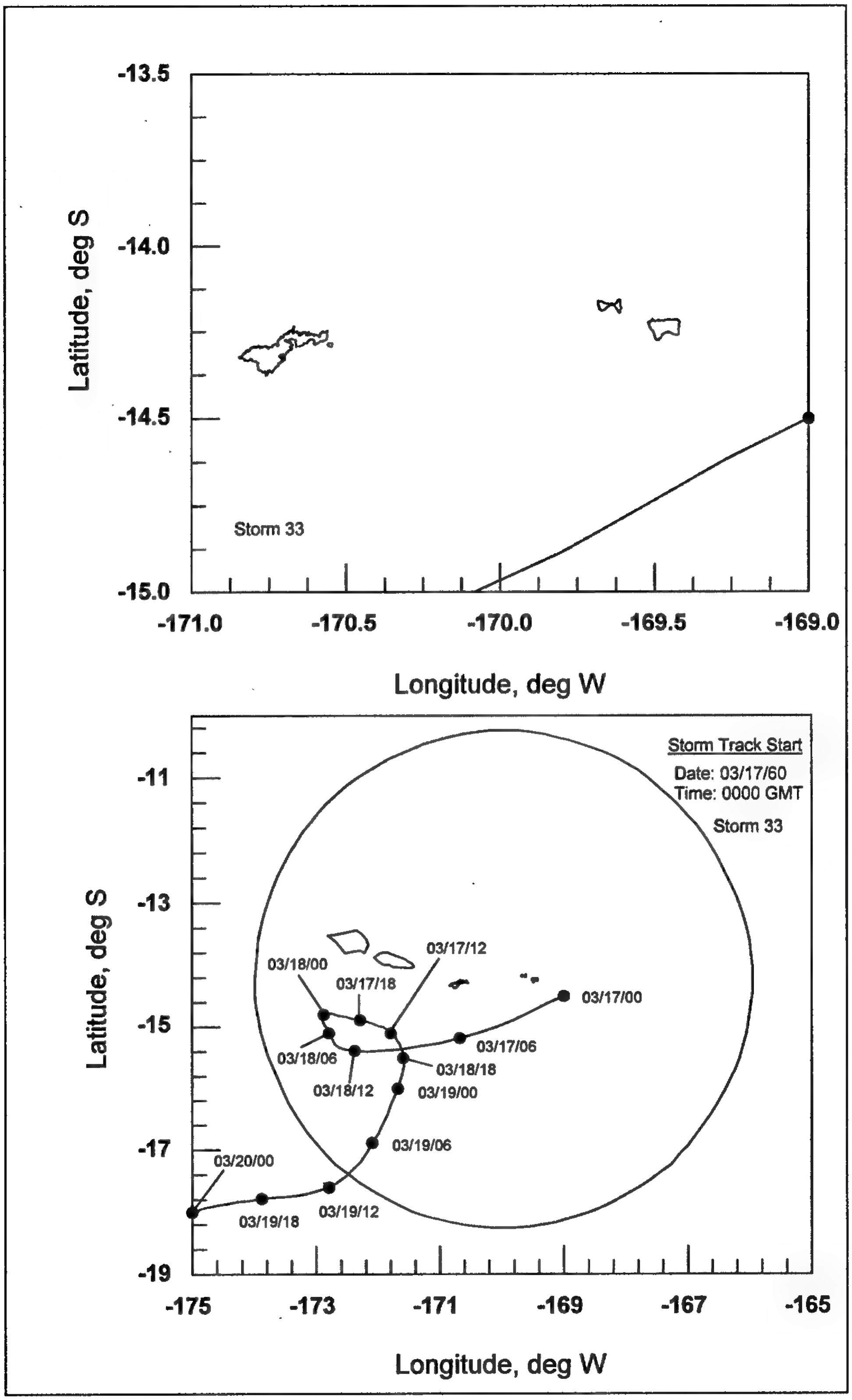


Figure E.5 Storm track for storm number 33

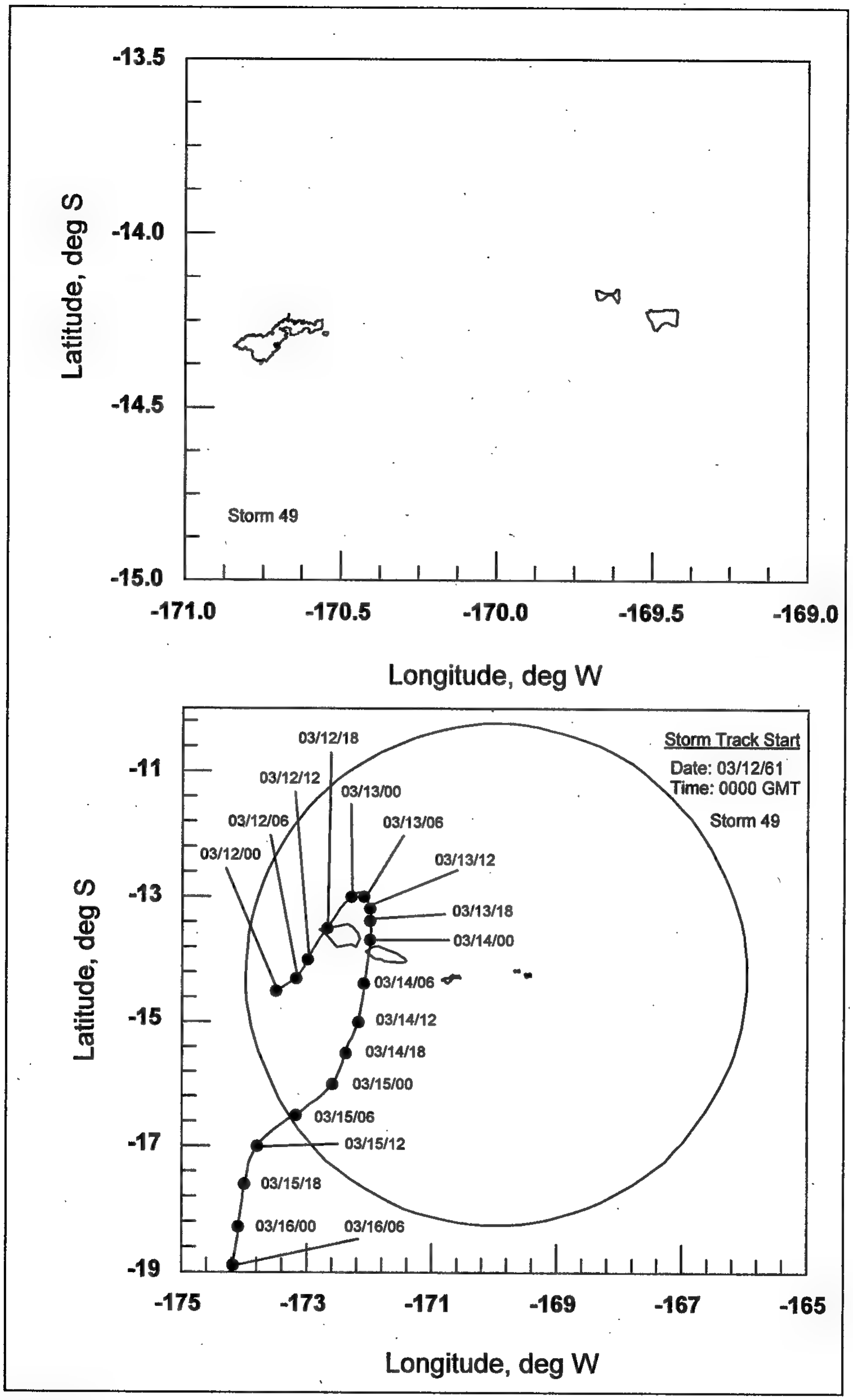


Figure E.6 Storm track for storm number 49

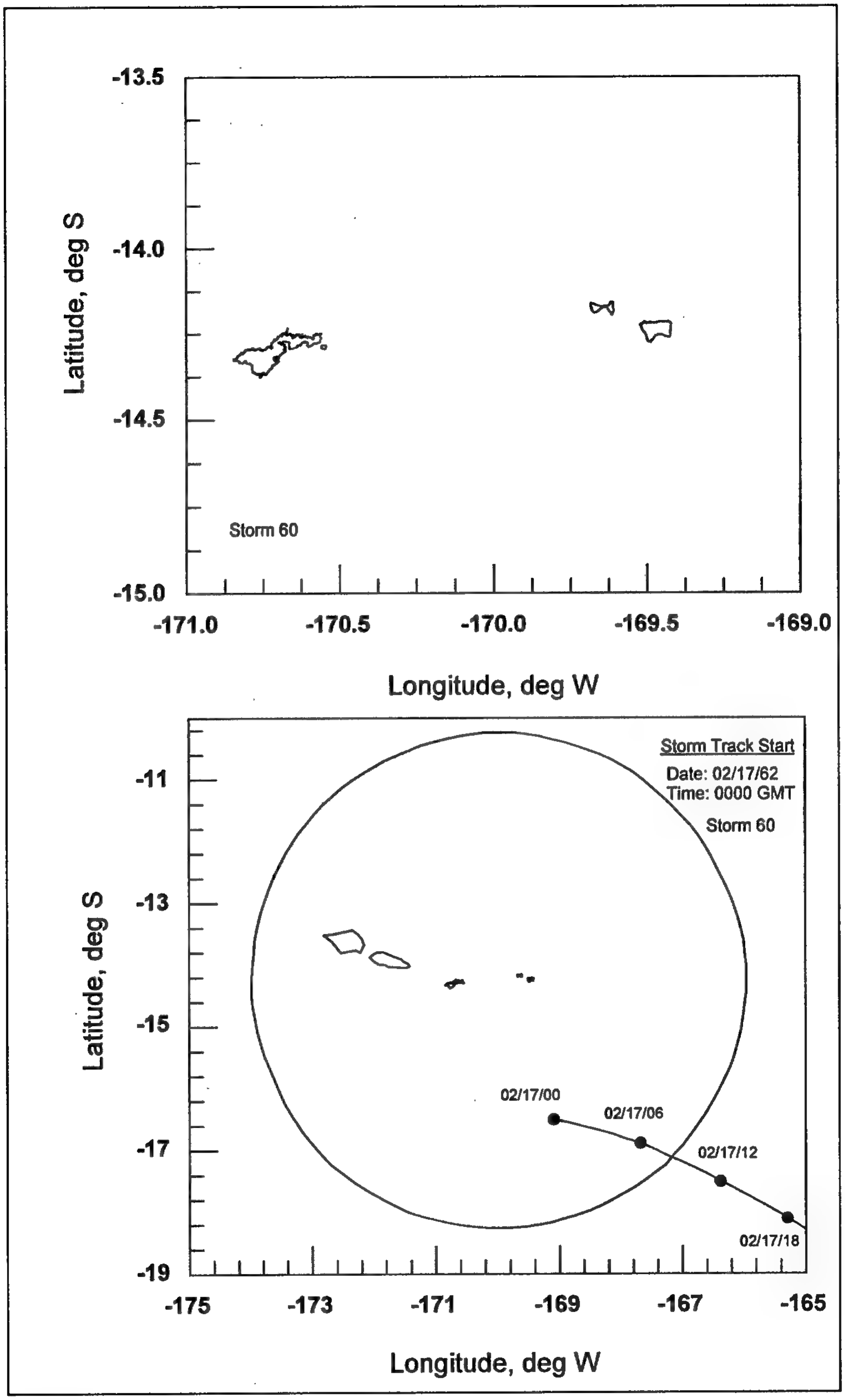
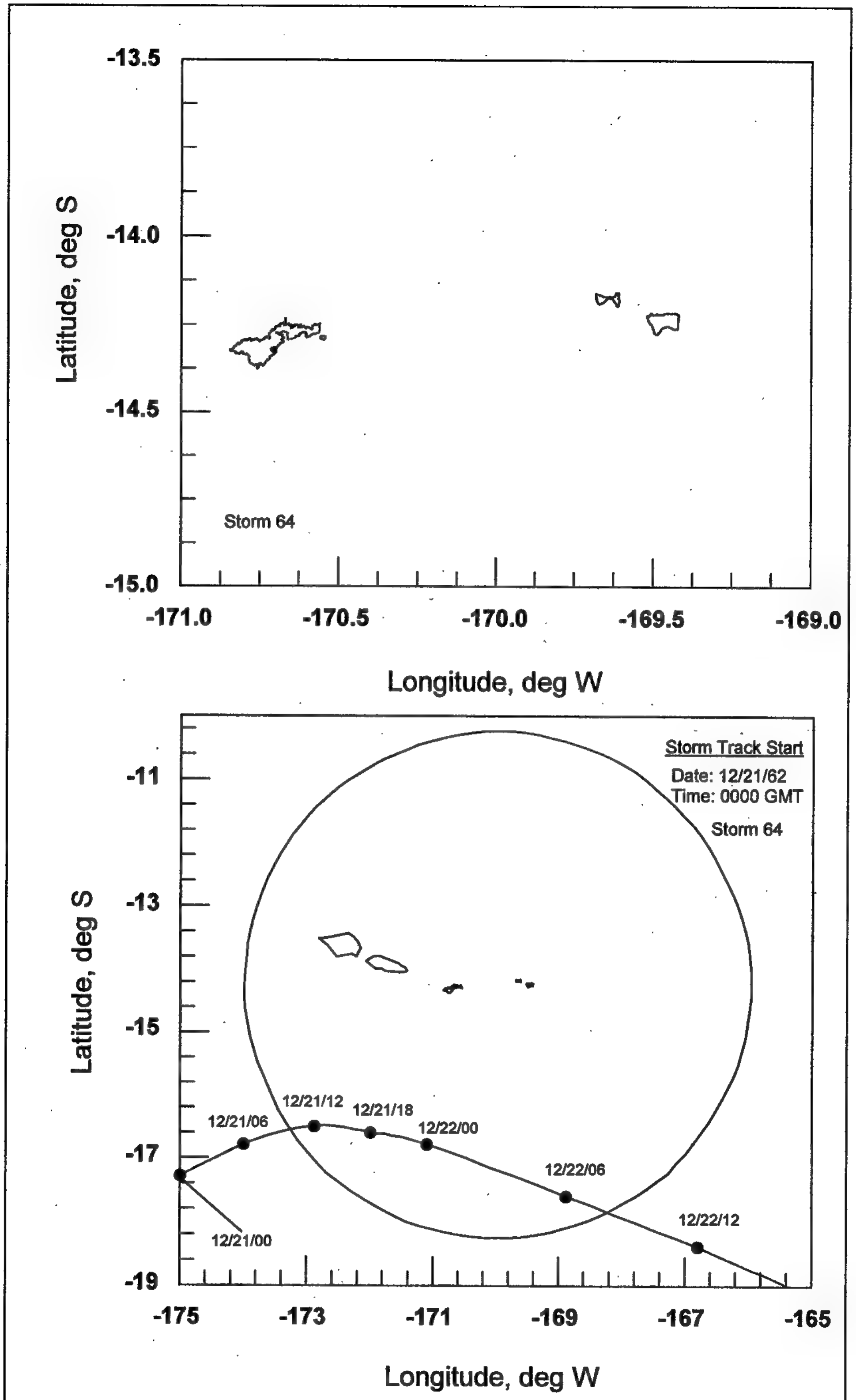


Figure E.7 Storm track for storm number 60



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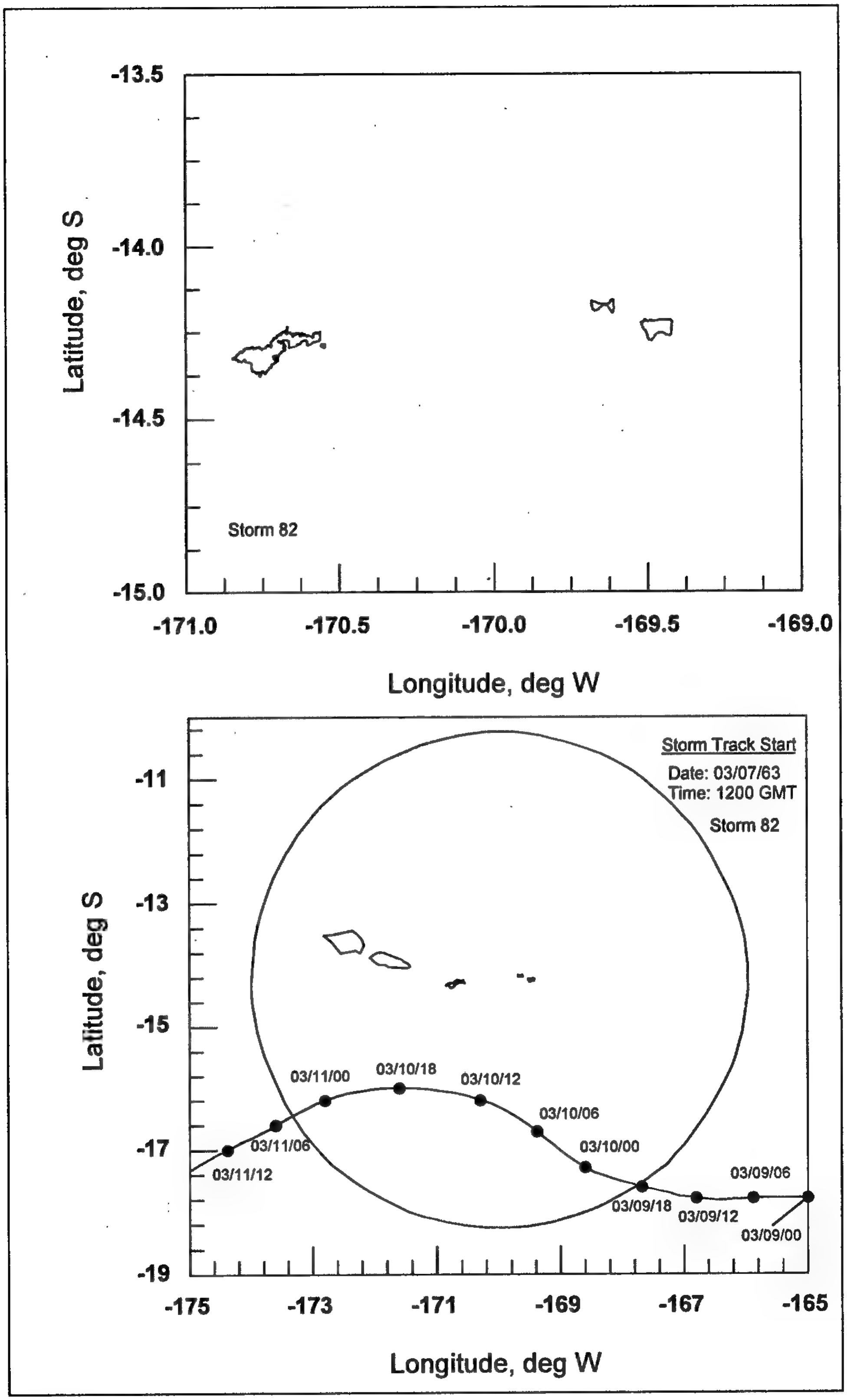
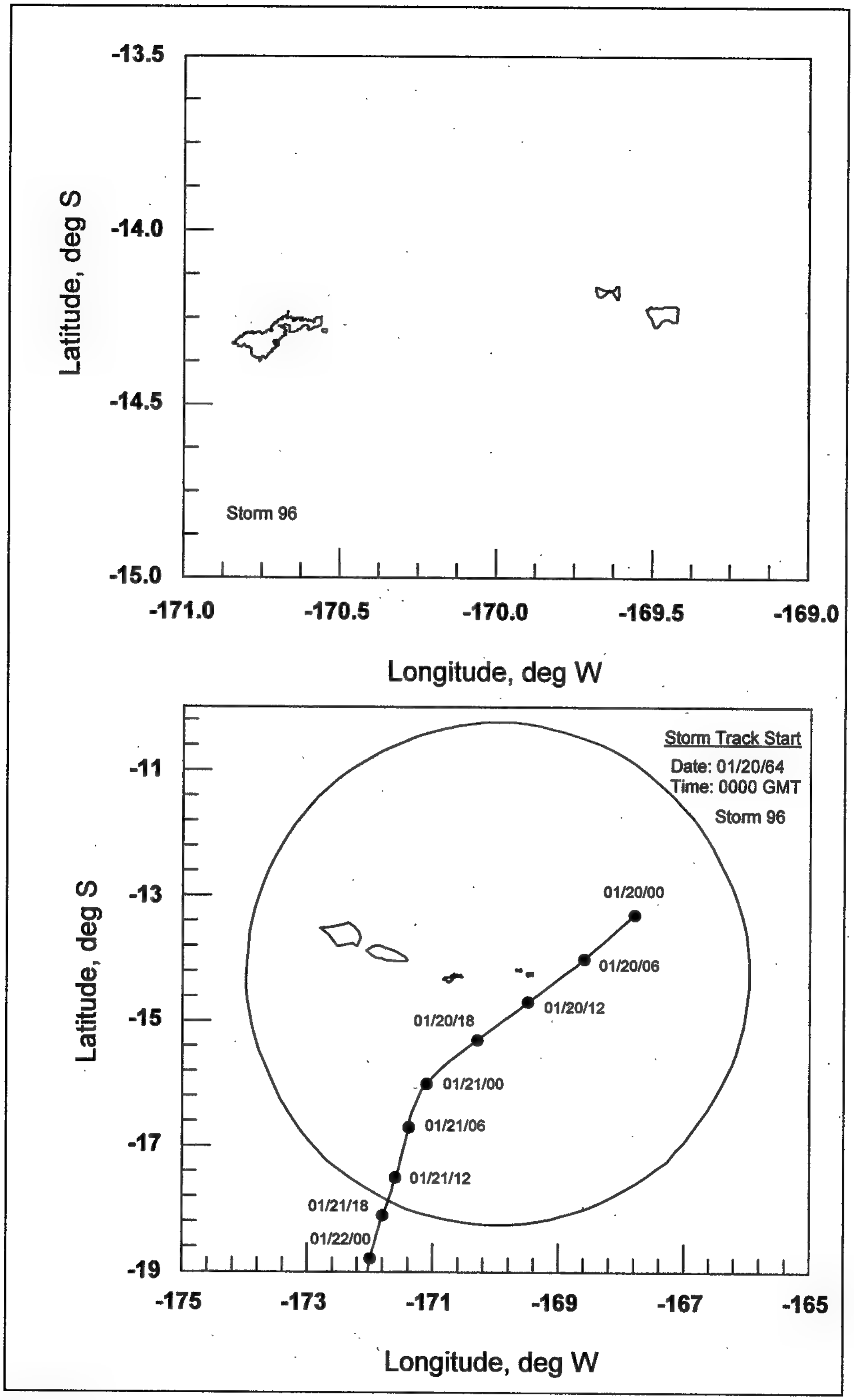


Figure E.9. Storm track for storm number 82



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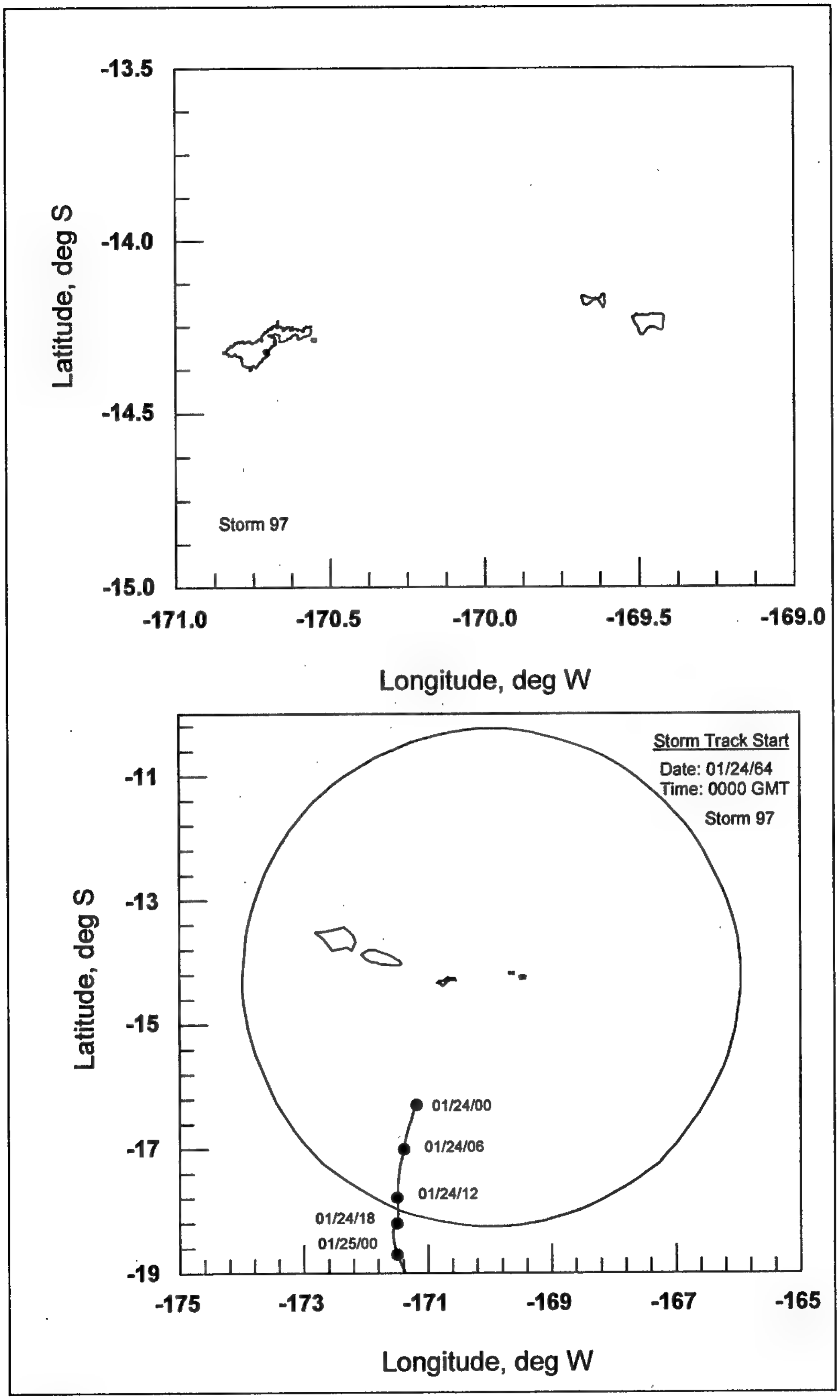

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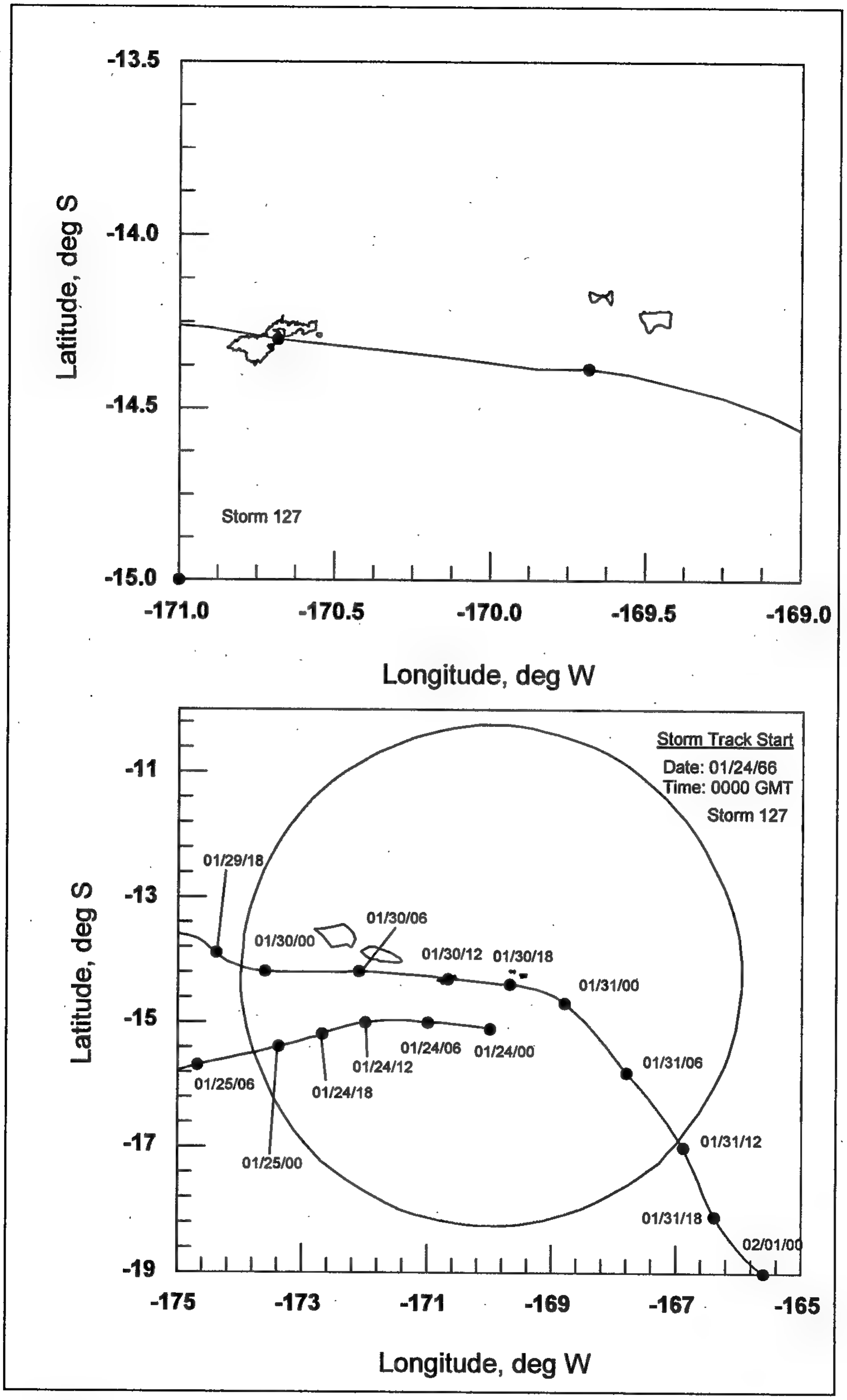

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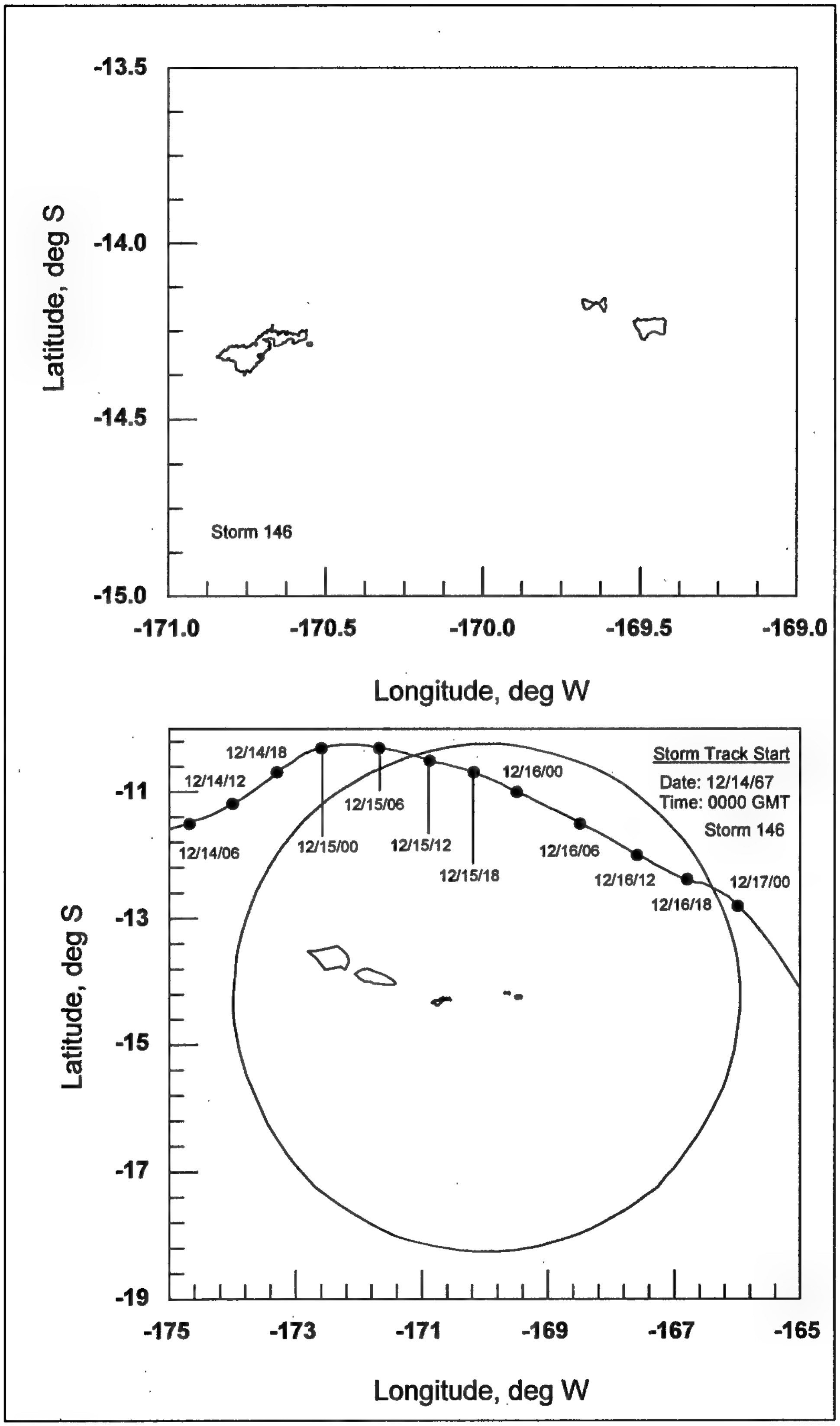

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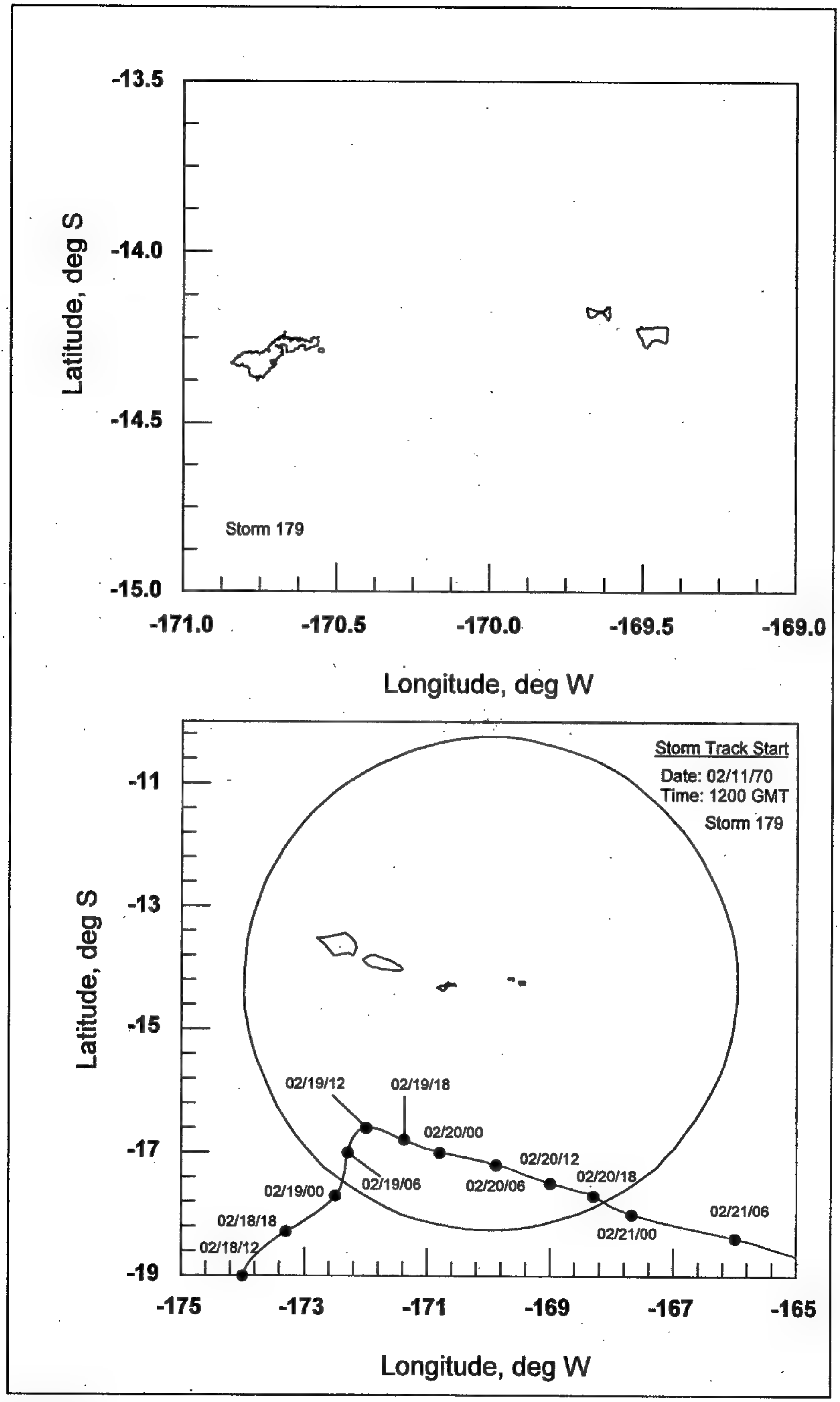
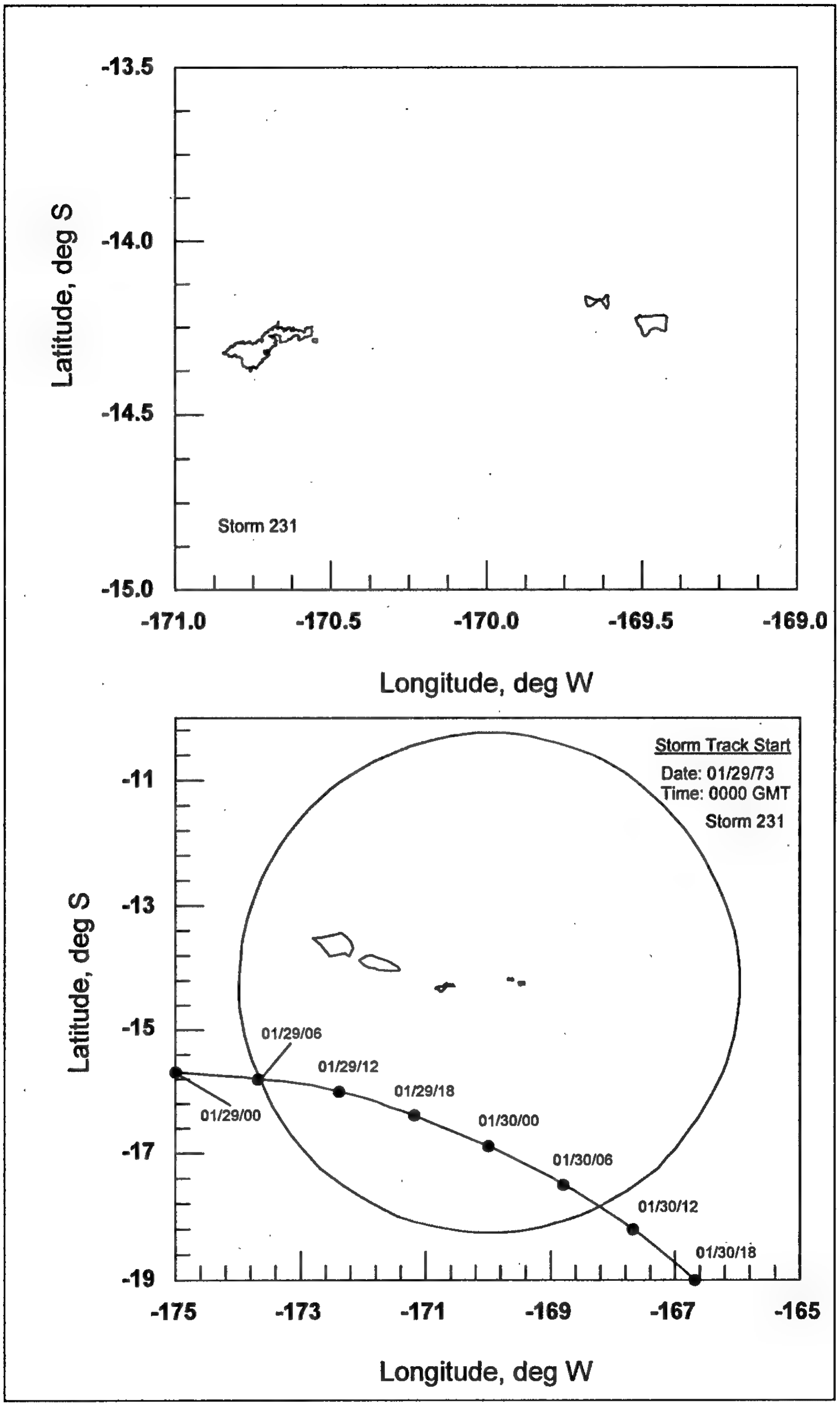


Figure E.14. Storm track for storm number 179



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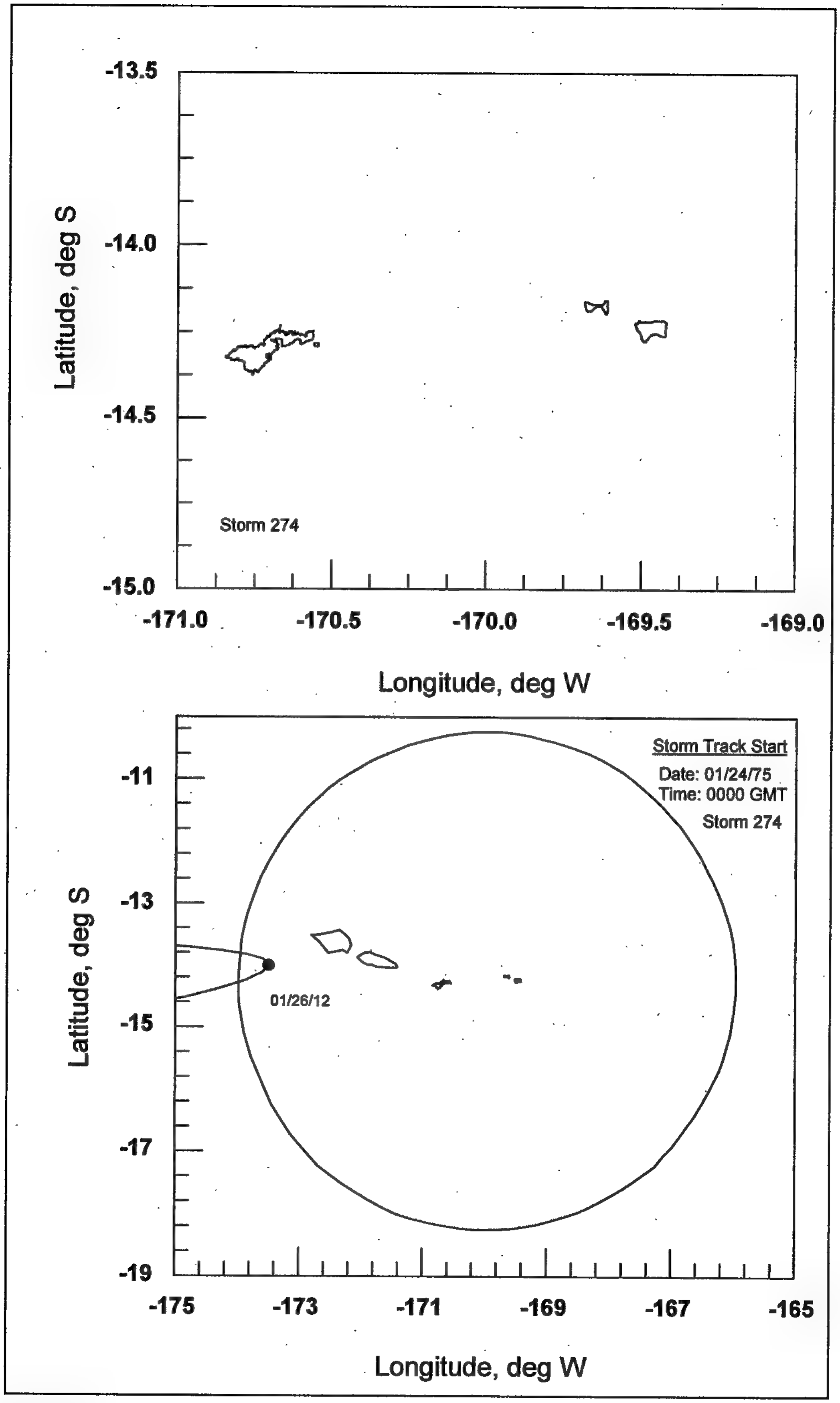

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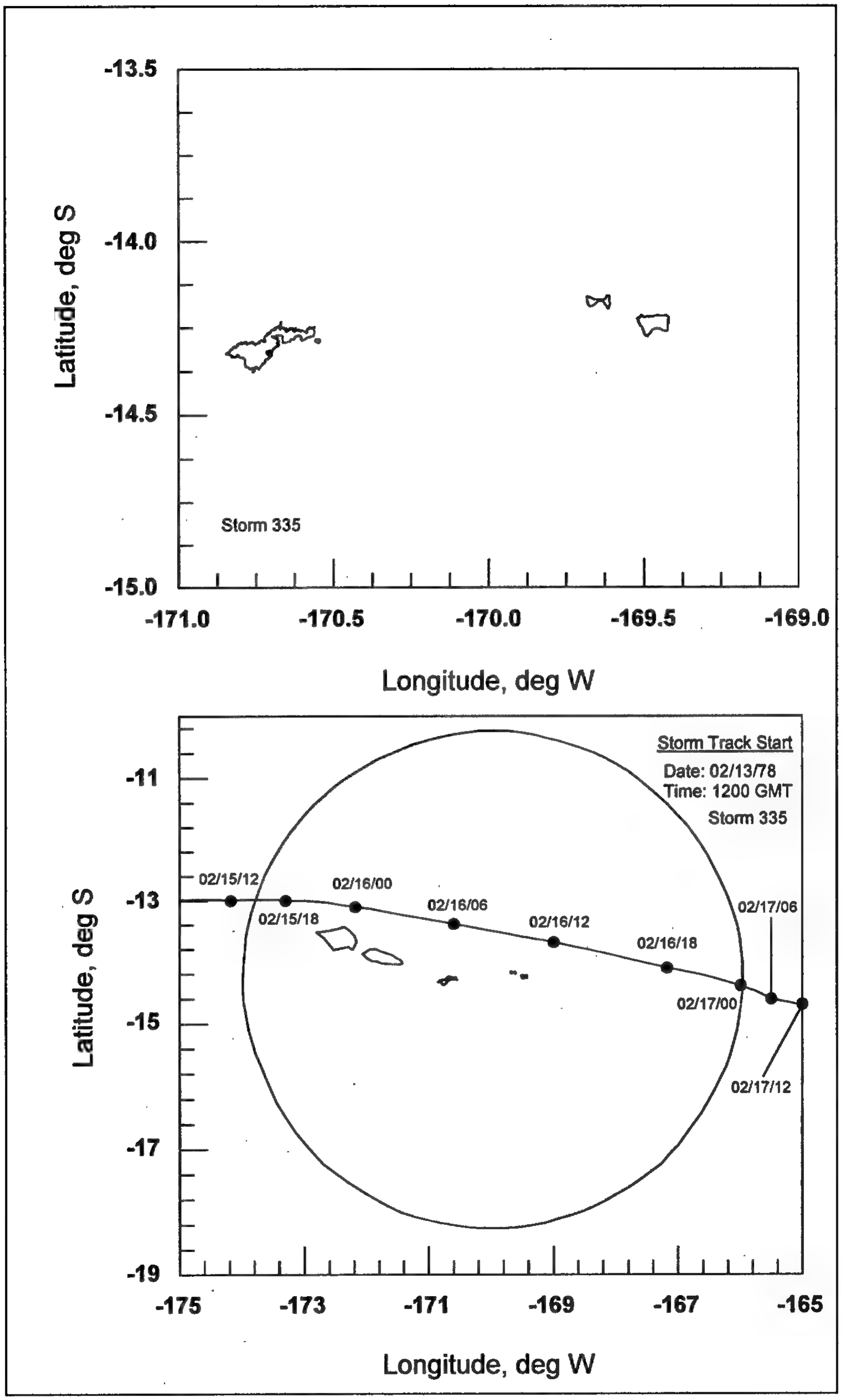

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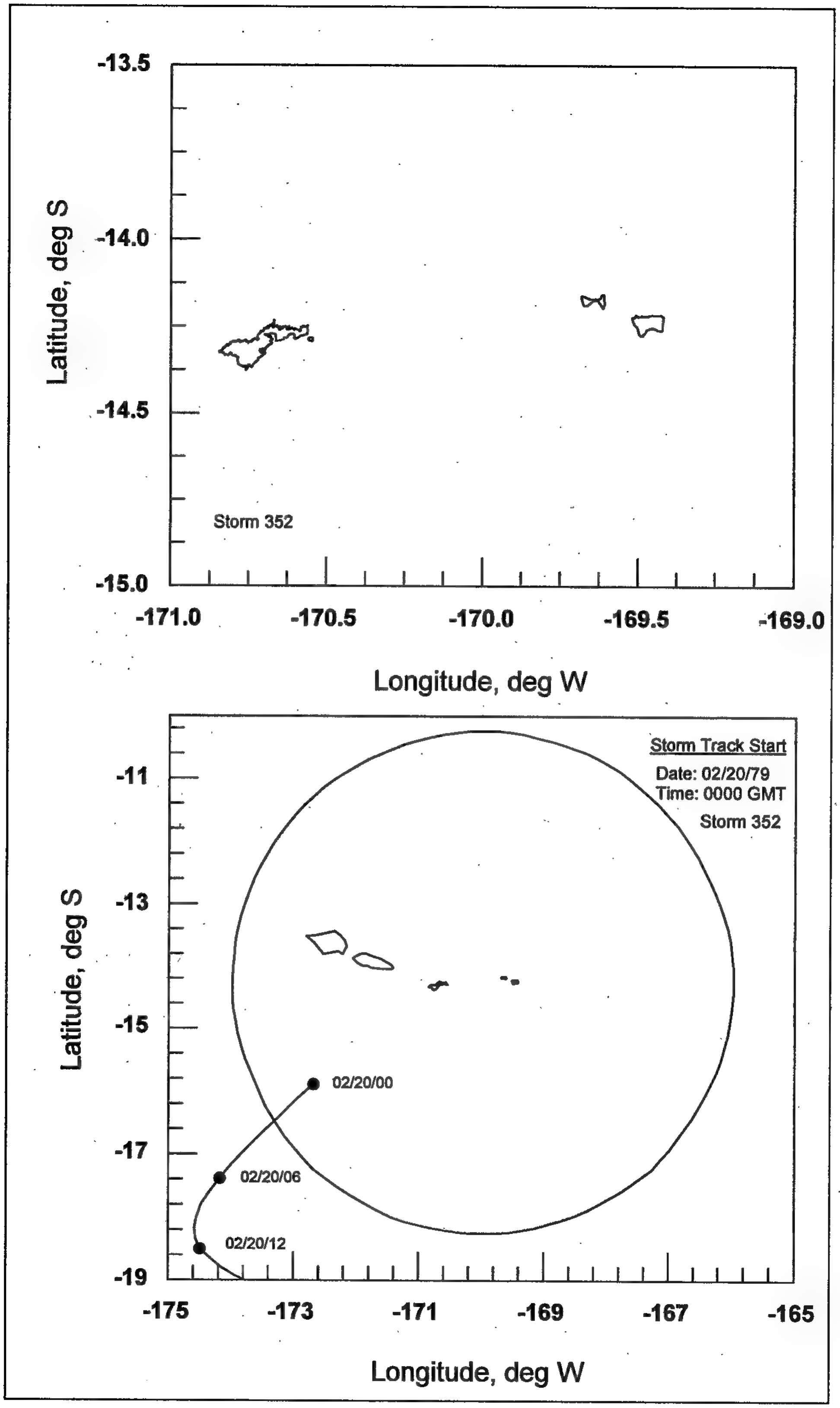

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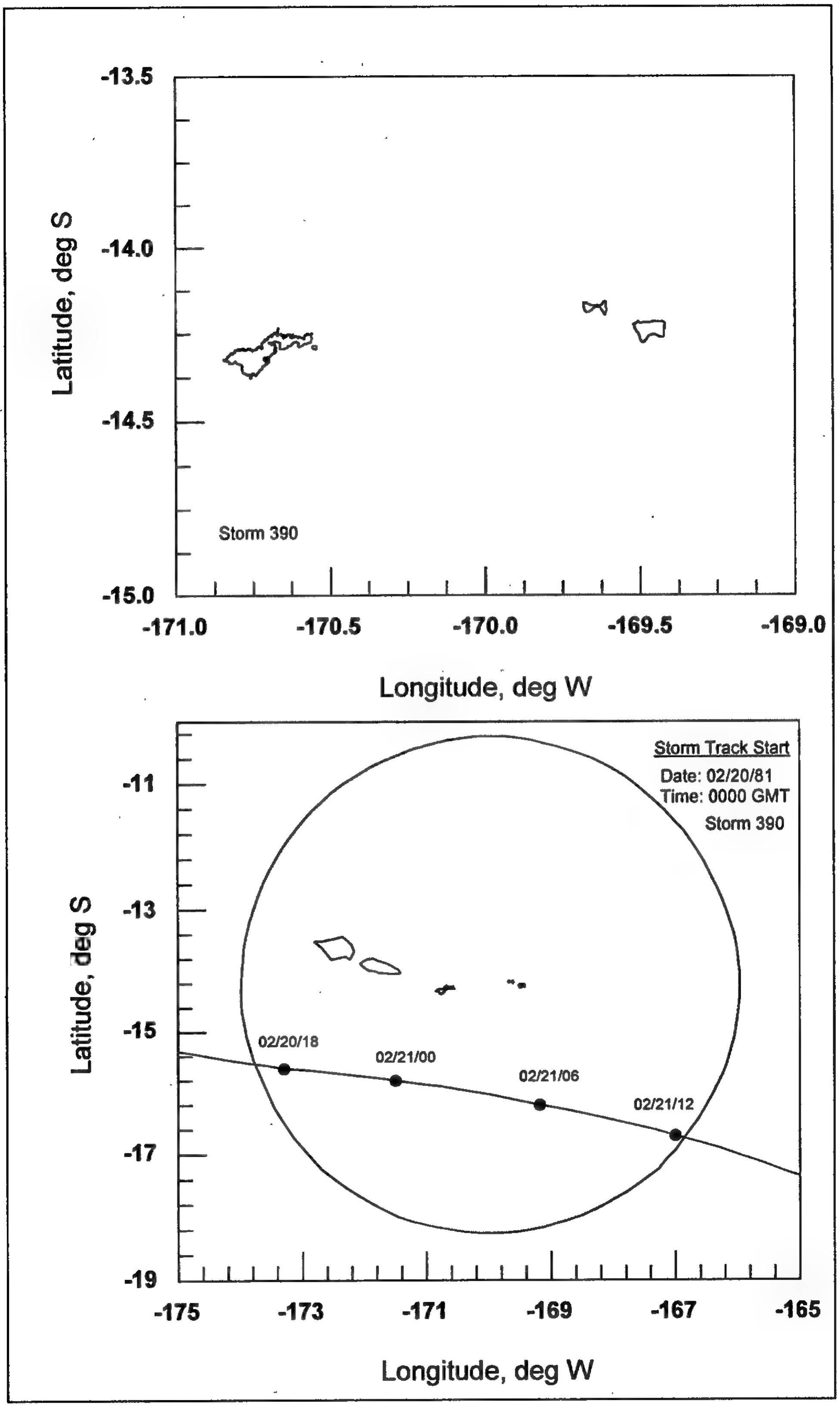

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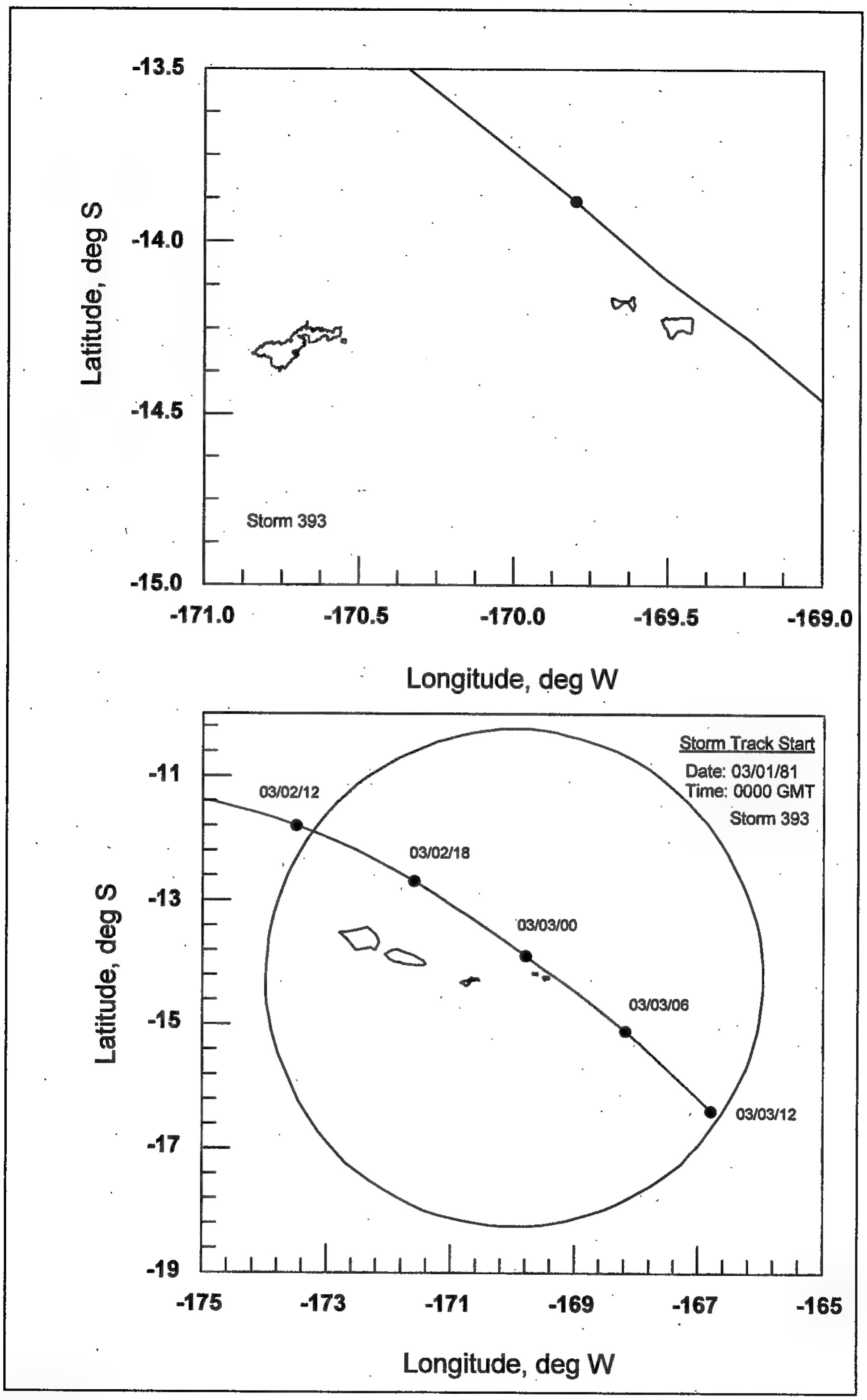

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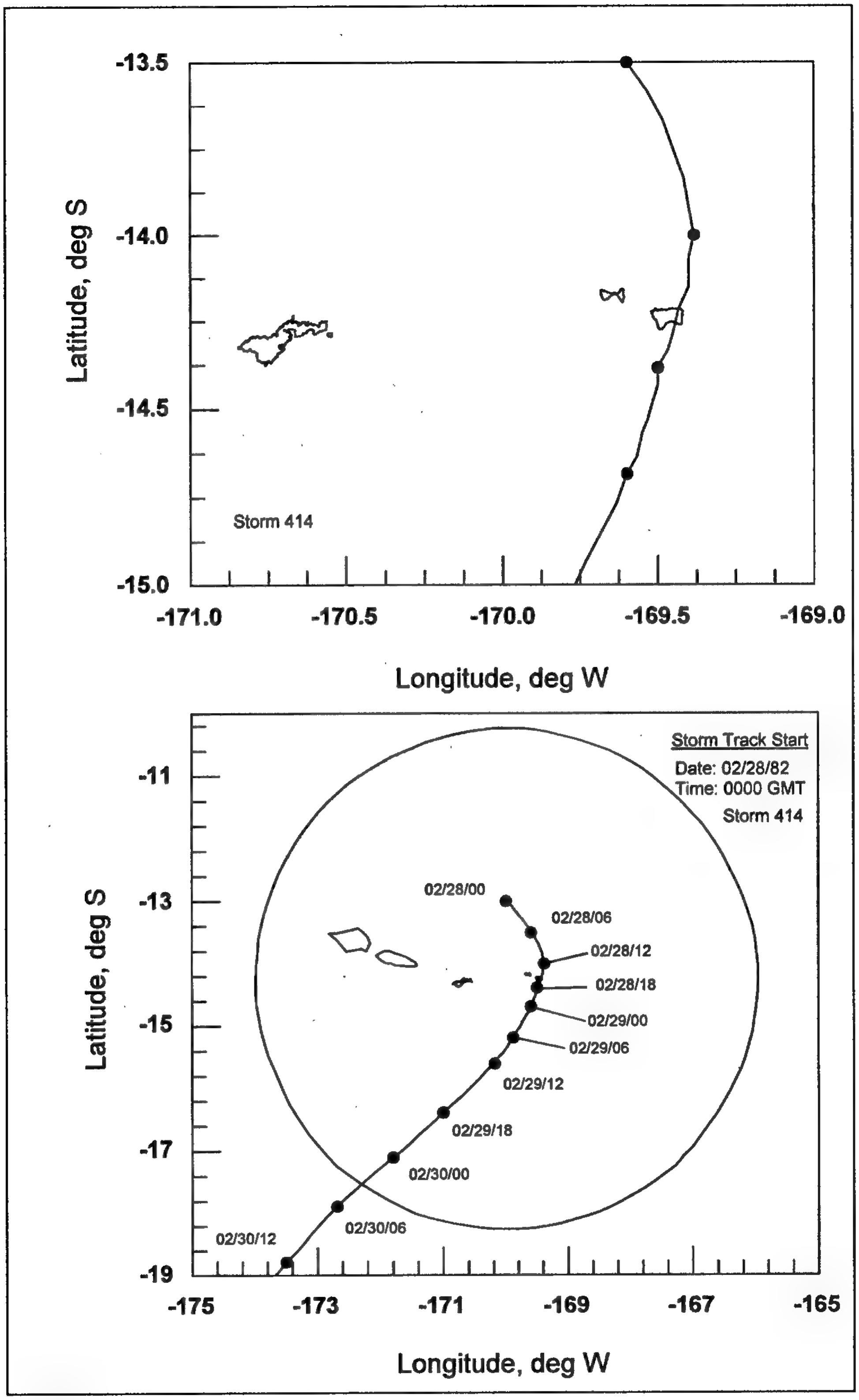

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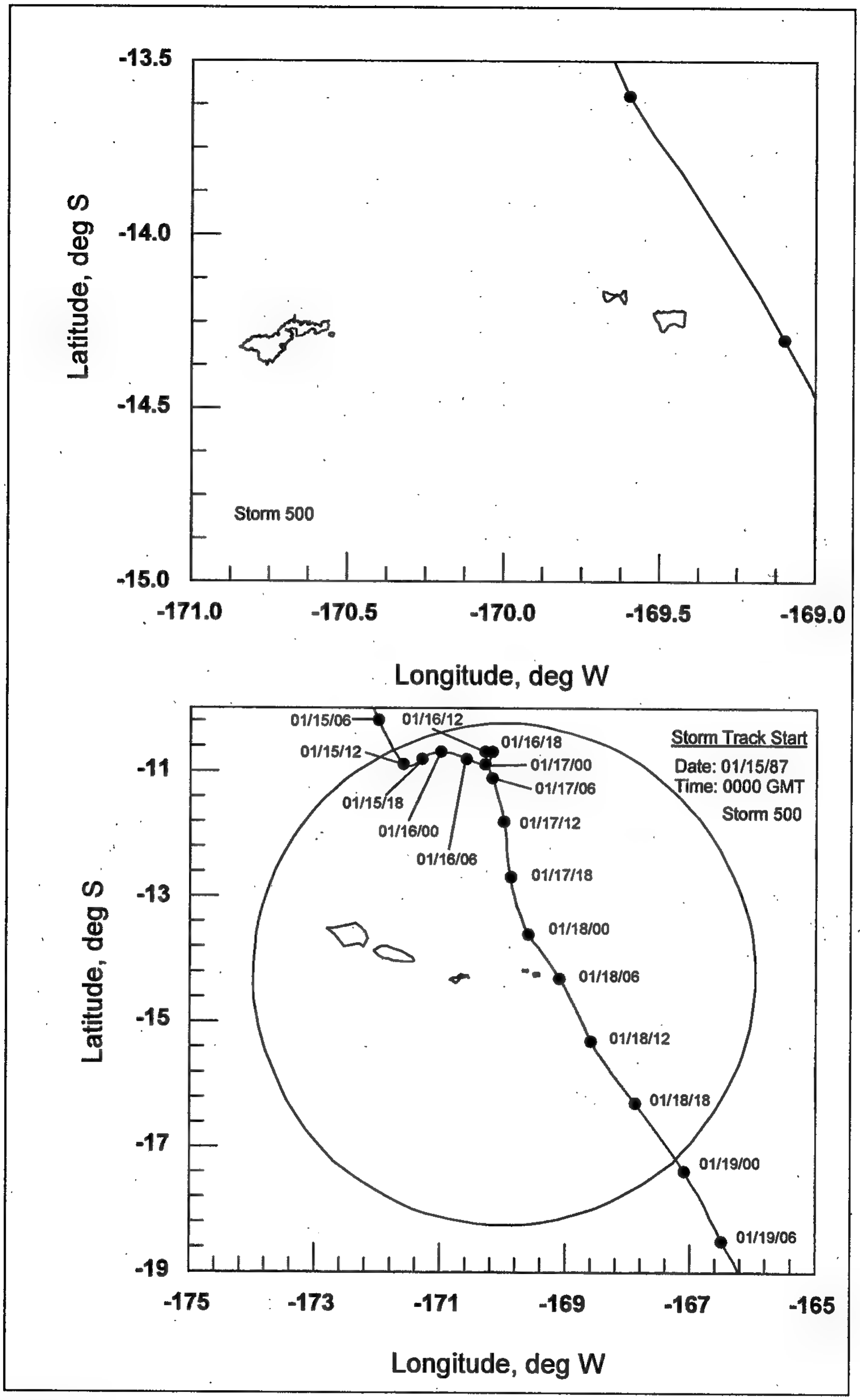

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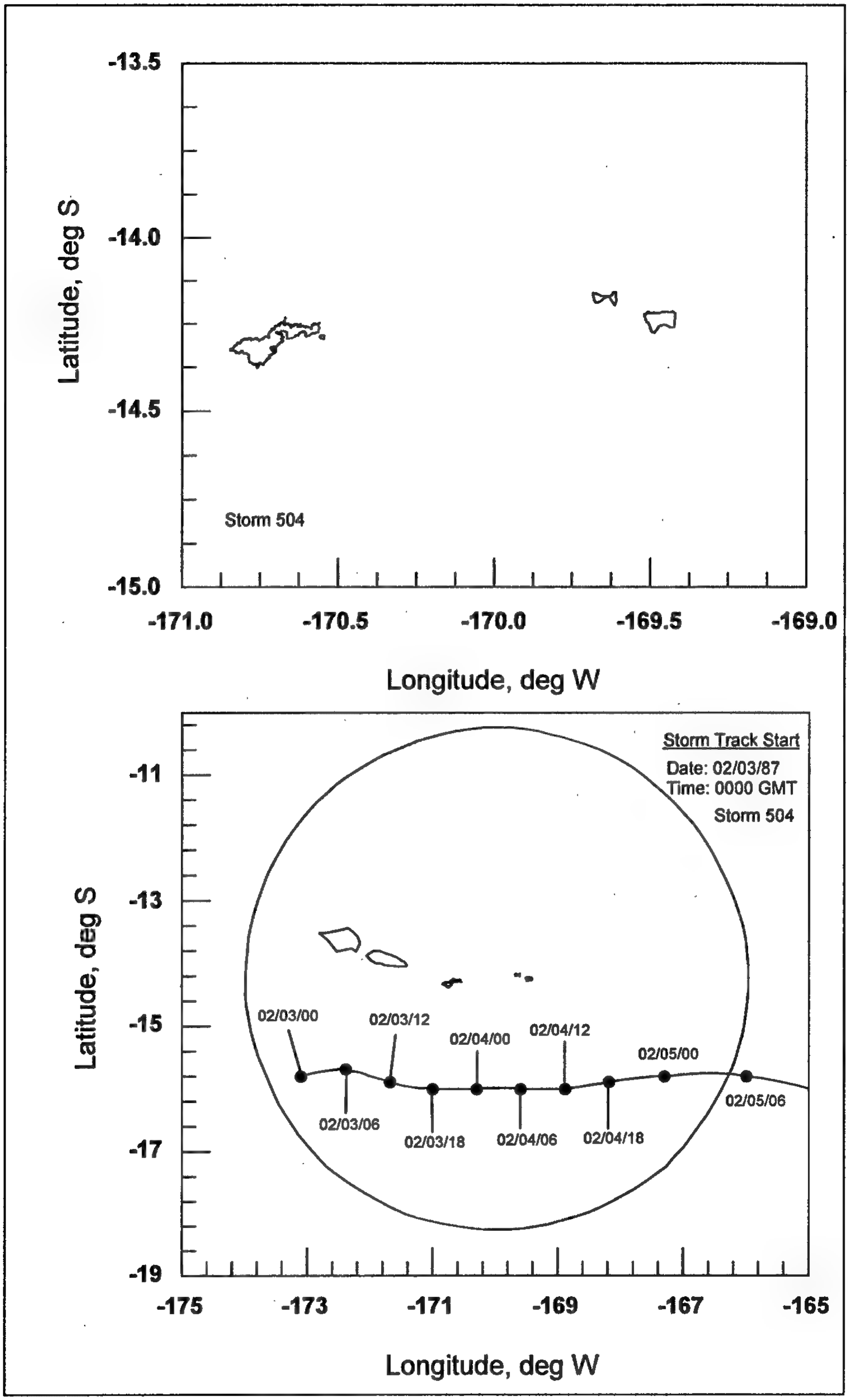

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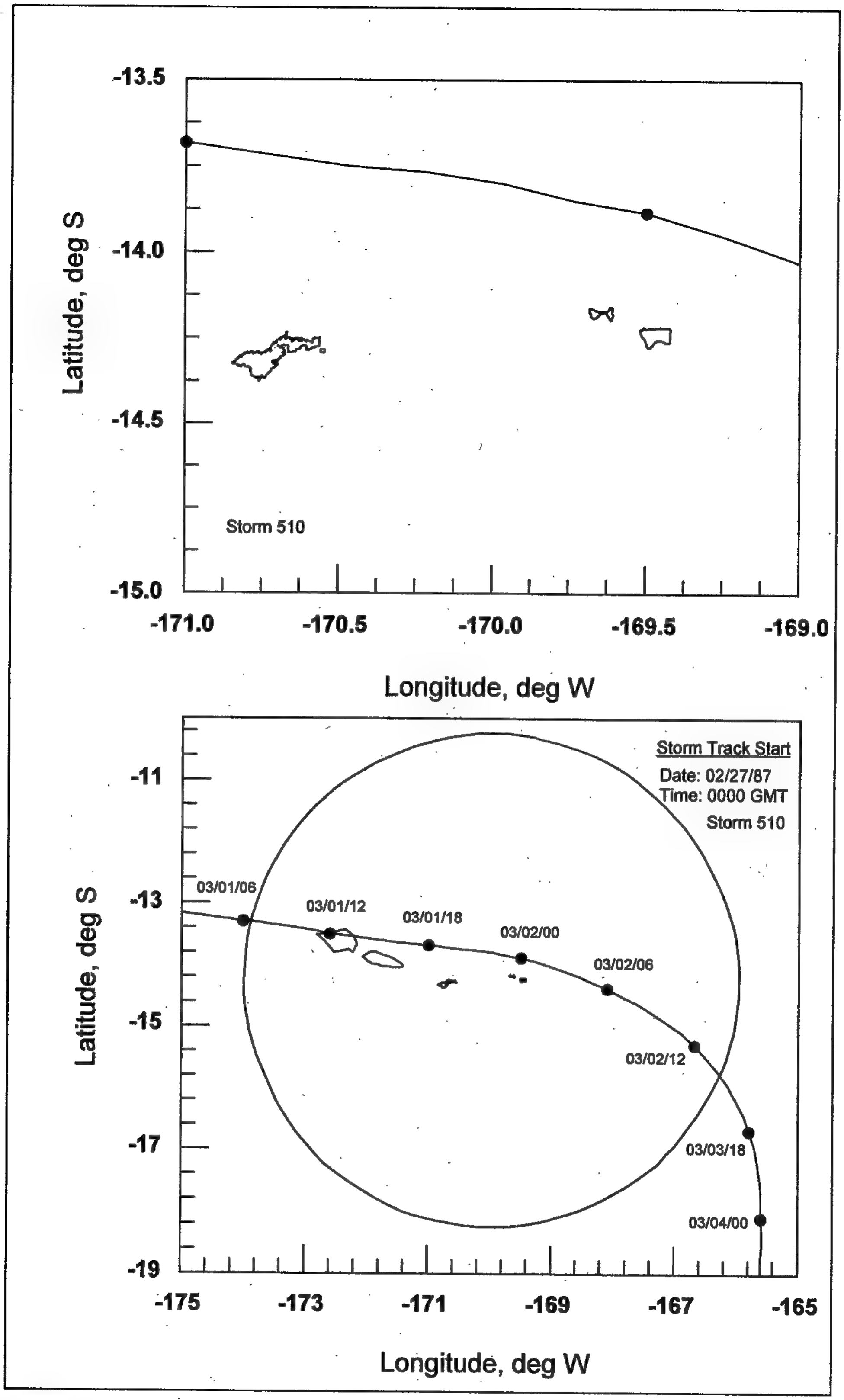

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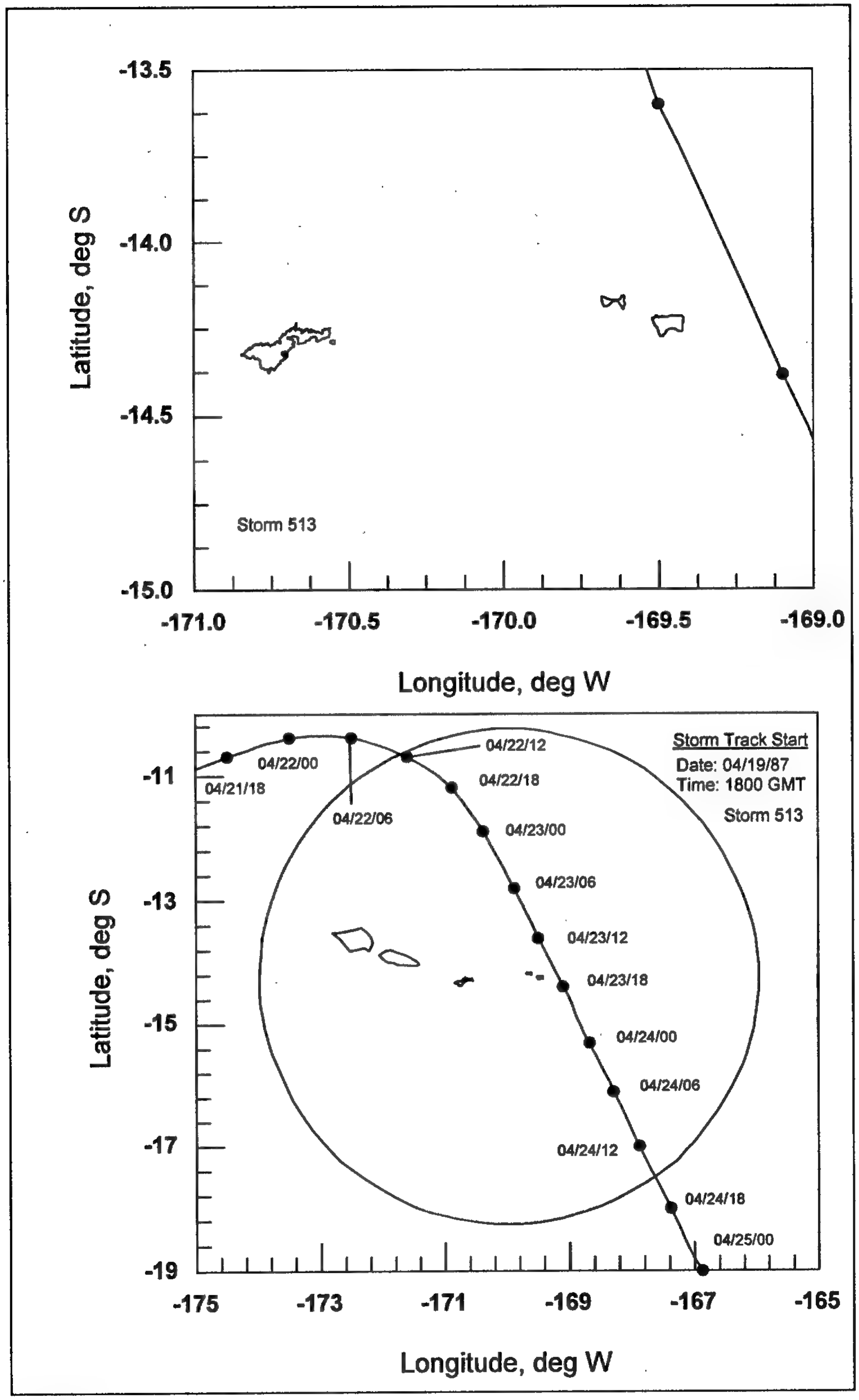

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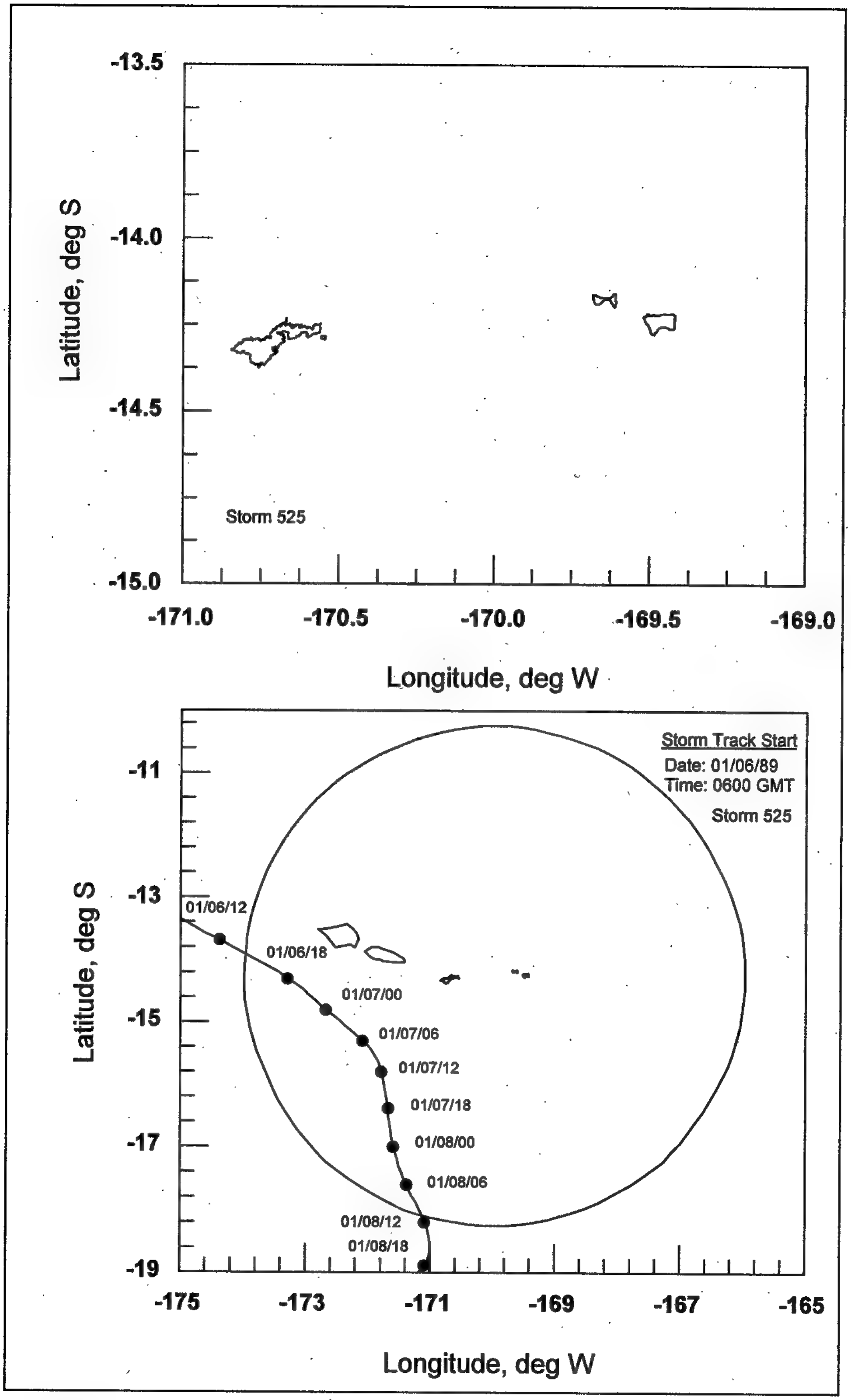

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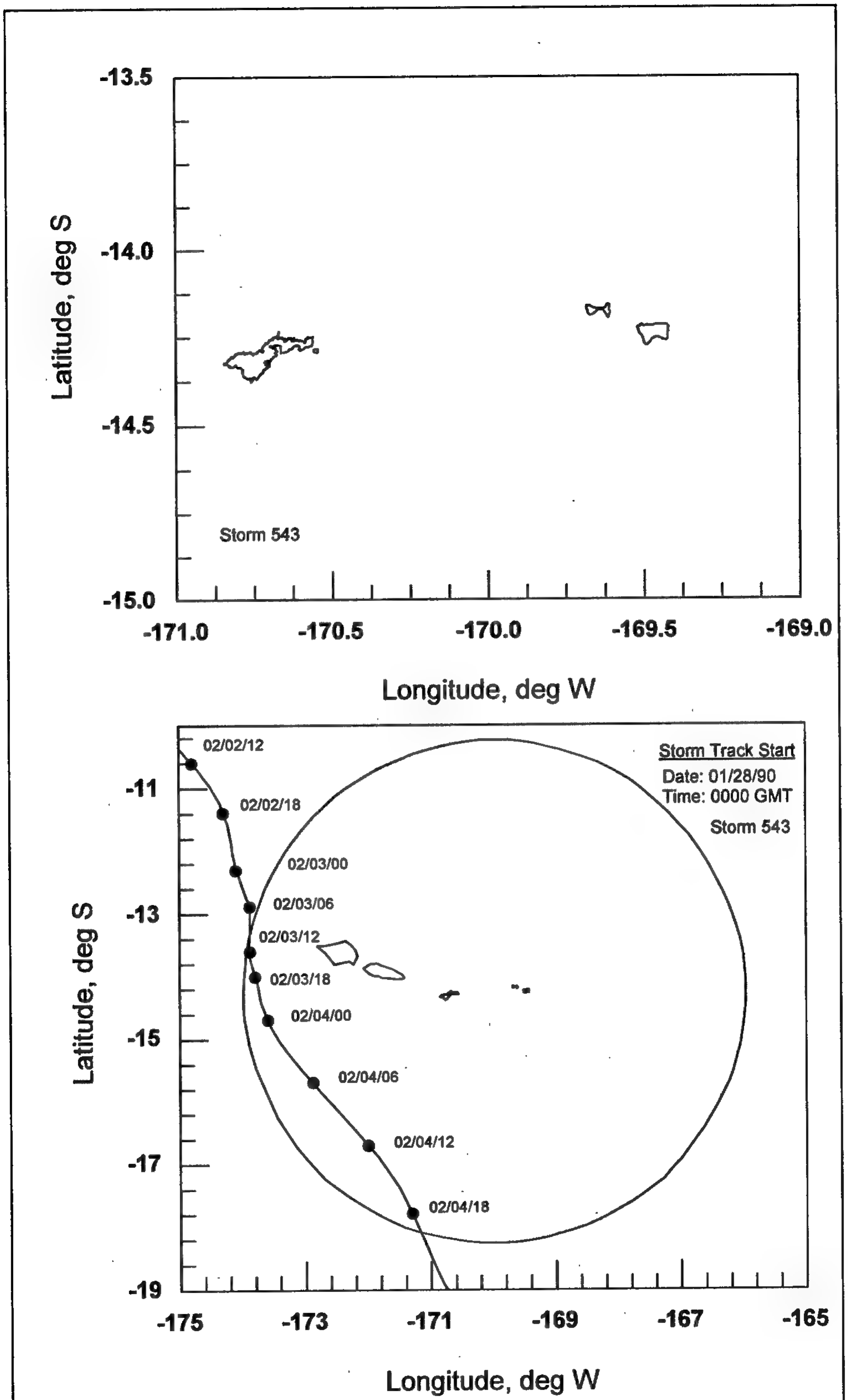

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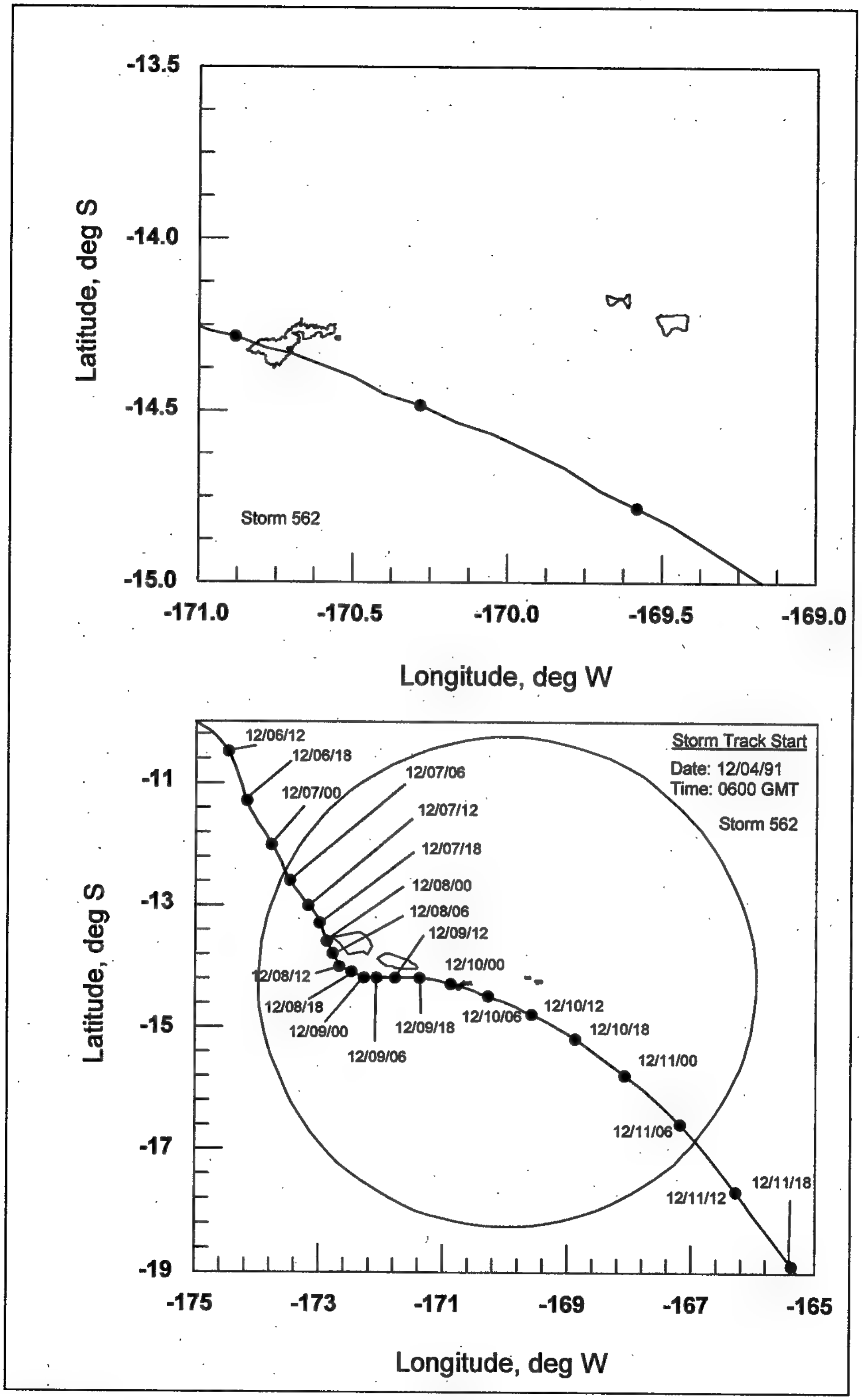

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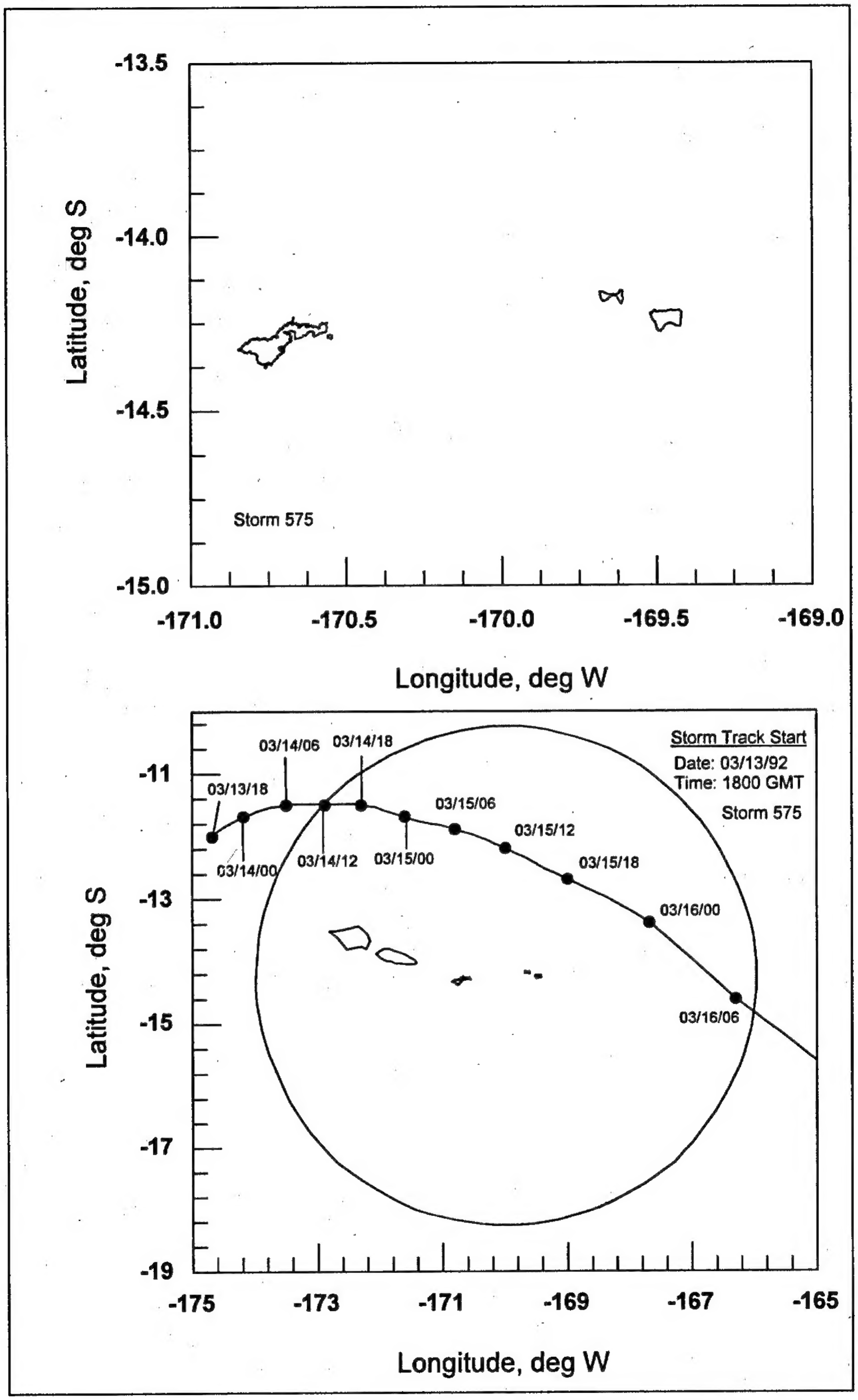

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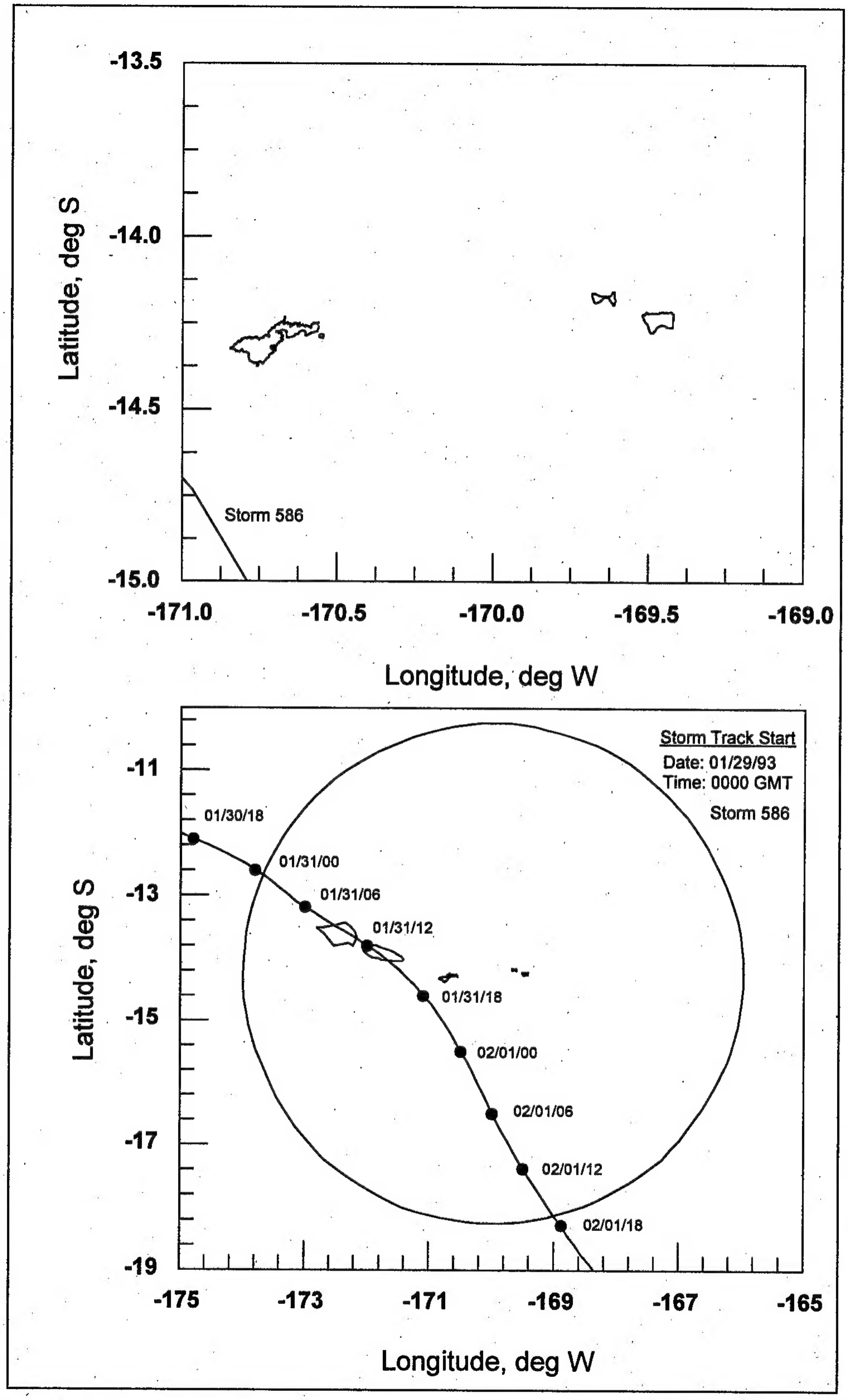

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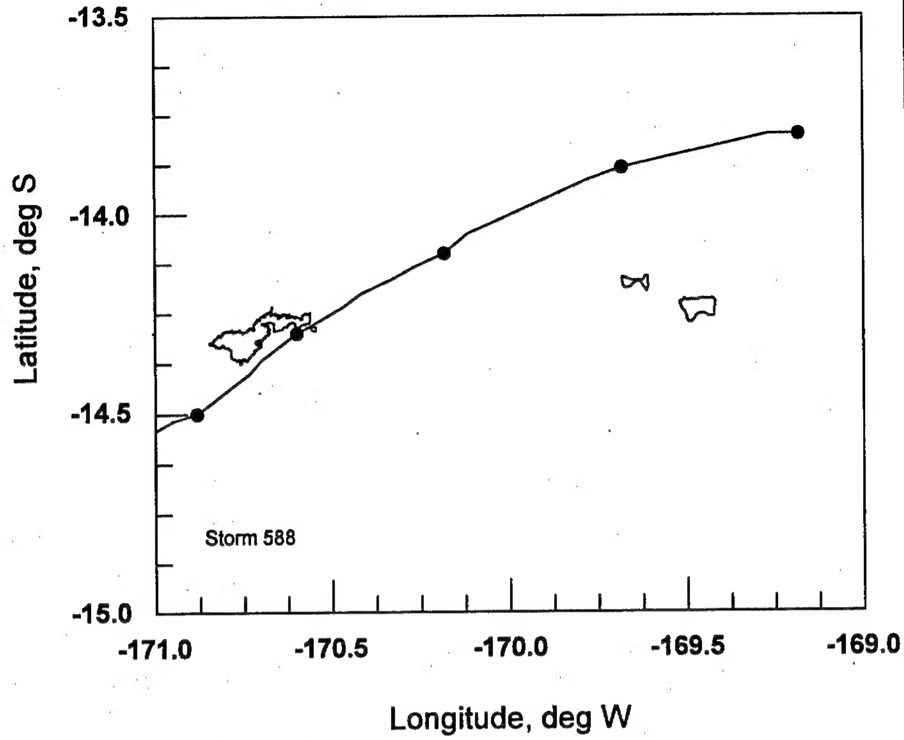

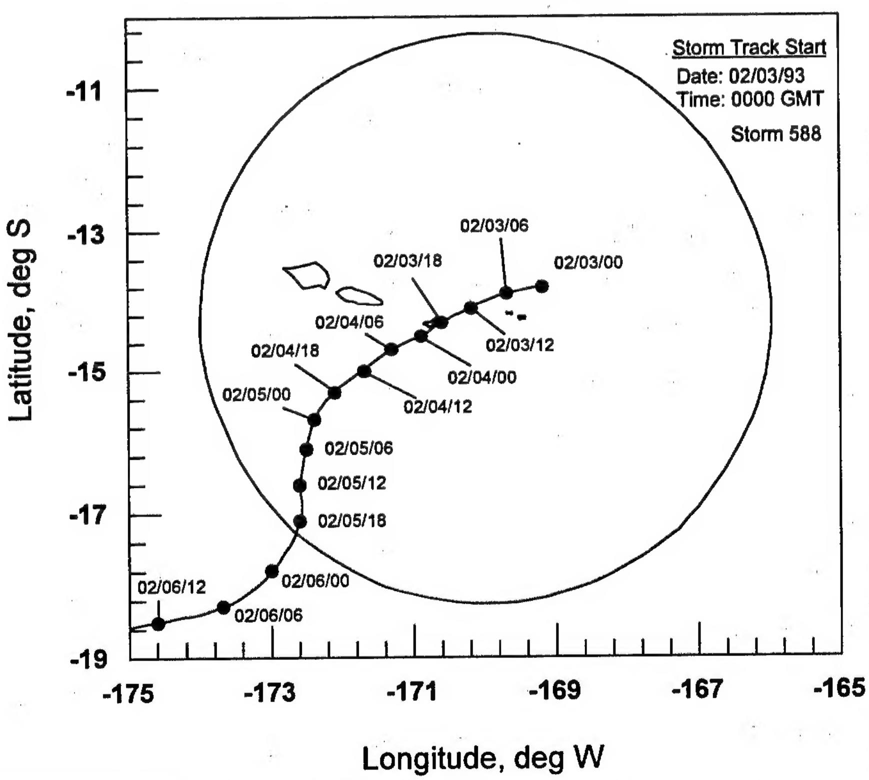

Figure E.31. Storm track for storm number 588

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14. ABSTRACT

This report describes the methodology for computing coastal storm-induced water surface elevation versus frequency of occurrence relationships for the U.S. territory of American Samoa. Maximum inundation levels were computed from a combination of representative tidal elevations, storm surge, wave-induced setup, ponding level on fringing reefs, and wave runup. The statistical approach taken to calculate frequency-of-occurrence relationships was the Empirical Simulation Technique, which applies historical wave information and a nearest neighbor technique for simulating random storm events. Each phase of the study is described in detail and study results are presented in tables.

15. SUBJECT TERMS
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Finite element modeling
Hurricane modeling
Storm surge
Wave runup
Wave setup
Wind wave modeling

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